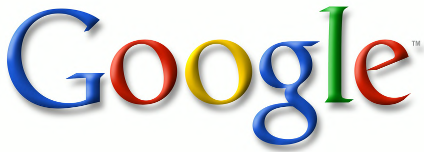


MEMOIRS

OF

MILITARY SURGERY.

BY D. J. LARREY, M.D. & CH.

INSPECTOR-GENERAL OF THE MEDICAL DEPARTMENT OF THE FRENCH ARMIES, &C.

CONTAINING THE

PRACTICE OF THE FRENCH MILITARY SURGEONS

DURING THE

PRINCIPAL CAMPAIGNS OF THE LATE WAR.

ABRIDGED AND TRANSLATED FROM THE FRENCH

BY JOHN WALLER,

SURGEON OF THE ROYAL NAVY.

IN TWO PARTS.

PART I.

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TO

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OF EDINBURGH;
MEMBER OF THE IMPERIAL SOCIETY OF MEDICINE, MONTPELIER;
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SOCIETY OF LONDON;
LATE INSPECTOR-GENERAL OF HOSPITALS OF THE BRITISH ARMY IN
SPAIN, PORTUGAL, AND FRANCE,

UNDER THE COMMAND OF

HIS GRACE THE DUKE OF WELLINGTON,

THE FOLLOWING TRANSLATION OF

LARREY'S MEMOIRS

OF

MILITARY SURGERY

IS OFFERED,

AS A SMALL TOKEN OF ESTEEM, GRATITUDE, AND RESPECT,

BY HIS MOST DEVOTED SERVANT,

JOHN WALLER.

INTRODUCTION.

THE progress made in Science by a rival nation, cannot fail to be at all times an object of interest to its votaries; but at the present period, when twenty years of warfare have nearly suspended all communication between the literati of the two nations, and their respective discoveries and improvements have been in a great measure independent of each other, we look with unusually eager expectation on the restoration of that connection and communication, for the improvements, or changes, which so long a period, conspicuous for so many great events, has produced in both speculative and practical science. The art of medicine, which has its origin in the misfortunes and miseries of mankind, is benefitted and enriched likewise by the calamities of war; and it ought to be expected, after so long a period of disasters, that the practitioners of military medicine and surgery of both nations, have availed themselves of every opportunity to enrich and improve their art. The extensive scale upon which our armaments both by sea and land have been conducted, has opened a no less extensive field for the observations and experiments of military and naval surgeons: ample opportunities have been

afforded them of bringing hypotheses, and matters of opinion, to the test of experience, so as to pronounce a decisive judgment upon them; of correcting ancient prejudices, and of laying open new subjects of investigation, and new paths of science. The French military surgeons have likewise had their full share of these advantages; and by the volumes before us it will be seen, that they have not been deficient in industry, or in observation of all the various phenomena which nature has presented to them.

The Baron Larrey, from the high official situations which he has held, and the many important campaigns in which he has served, is undoubtedly entitled to our attention and consideration. He has laboured with a most ardent zeal and indefatigable perseverance to improve the art which he professes, and to extend its advantages; and he appears to have availed himself of every source of information to obtain a knowledge of the diseases peculiar to every country through which he has passed, and has conveyed that information to his readers in a clear and succinct method. Whatever relates to the health of the soldier and to his treatment under disease, he has carefully investigated, and clearly laid down. The military and naval surgeon will not fail to gather much interesting matter from various parts of this volume relating to the subject of *hygeia*, as well as to the treatment of disease: even in those points where our author differs widely in his practice from the established maxims of our practitioners, much interest will often be excited. The reputation which this work justly enjoys on the continent, and in our own country, amongst those into whose

hands it has fallen, supersedes the necessity of any recommendation from a translator.

There are indeed certain points which the title page of the book impresses at once upon the mind of the reader. Regarding the work as a system of military surgery, it was a *desideratum* to the medical world; as containing the practice of men educated in other schools, and influenced by different systems to our own, it is an object of interest; as in those points where we differ, it awakes inquiry; whilst in those where we agree, it brings a strong confirmation of the truth of the doctrine; the conclusions being most probably arrived at by different trains of reasoning. Lastly, as being founded on an extensive experience, such as seldom falls to the lot of any single practitioner, the doctrines it contains are entitled to consideration, and ought not to be hastily rejected. Such are the ideas which naturally impress themselves on the mind of the person who considers this work as the production of a surgeon of first-rate eminence, in a country where the art of surgery is allowed to have obtained an exceeding high degree of improvement.

The original work of M. Larrey consists of three tolerably large octavo volumes, one half of which, however, is taken up with military details, and descriptive sketches of the countries through which the author passed. These minute details answer no other purpose than to swell the bulk of the work, without adding any thing, in a medical point of view, to its value: the reader, indeed, who seeks for medical information, will have often to turn over many pages in succession with impatience and dis-

satisfaction, nay, not unfrequently with disgust. The author seems to take it for granted, that no accounts of the military transactions of the French armies have ever been published to the world, except the bulletins of his master. I have omitted almost the whole of these details, in order to present to the medical reader the valuable part of the work. All the campaigns previous to those of Egypt are of this description, the medical observations being for the most part referred to the different memoirs which occur in the course of the work, and which constitute properly the medical, and most valuable part of it. These I have for the most part given entire, excluding only occasionally a few pages of hypothetical reasoning, and sometimes abridging the number of cases, where it could be done without detriment, in order to keep the book within a moderate size. I have added but few notes, and those short; their number would have been still less, but for the tone of arrogance and conceit often displayed by the author, especially when he has occasion to mention any thing connected with this country. It is not, however, the vanity or conceit of the author, on political topics, which constitutes the most important defect against which I find it necessary to caution the reader in the work before us. The spirit of hatred to this country, with which Bonaparte has attempted, and successfully, to inspire his followers, has in some instances led our author to exceed those bounds of truth, within the limits of which every friend to science ought to consider himself religiously confined.

In speaking of the Egyptian Ophthalmia, M.

Larrey has expressed himself in such terms, as would induce the reader to suppose, that in the French hospitals, under the treatment of French surgeons, even the junior and inferior orders of them, this gigantic disease was treated with complete and universal success, which he ascribes to the publication of his memoir on the subject. He does not even stop here, but goes on to inform the reader, with *infinite modesty*, that in the English army this disease had been very destructive, and that the English surgeons could never succeed in the cure of it, until by accident this memoir was found in the hospital at Rosetta, when the treatment laid down in it was immediately adopted, and the consequences were, a complete and universal success. I do not hesitate to affirm, that the whole of this statement, from beginning to end, is false. We know, from many authentic sources, that the French army in Egypt suffered no less from the ophthalmia than our own; and the number of blind men, prisoners, who fell into our hands, was very great. I regret that I have it not in my power at this moment to state the exact number. One large ship taken in the Mediterranean, was crowded to excess with invalids totally blind on their passage to France. As to the memoir said to be found in the hospital at Damietta, I cannot help doubting very much whether ever it was seen by any of our medical officers. I have the authority of the Gentleman who was at the head of the medical department of the Indian army, serving in Egypt, to assert, that no such memoir was ever seen or heard of by

the principal medical officers serving in that country, much less was there any change made in the treatment of the ophthalmia in consequence of it.

We might look over the gross adulation bestowed upon the Chief of the French government, by a man looking up to him for preferment: these things are so frequent in most of the modern productions of that nation, that it would be invidious to reproach M. Larrey with it as a defect; it makes but little difference to science. The reader, however, will not fail to be astonished, when he finds a professor of surgery exhausting his rhetoric in attempting to prove, that it is far more advantageous for men severely wounded, and immediately after having undergone important operations in surgery (including fractured bones, trepanned skulls,) &c. to be removed, in the depth of winter, above a hundred and fifty or two hundred miles, in vile waggons and sledges, than to remain at rest in hospitals close to the scene of action. I do not pretend that Bonaparte was not compelled by necessity to adopt such a method at Eylau; though I know that many of the French officers themselves considered it as an unnecessary, wanton act of barbarity, which M. Larrey does not deny; but I cannot see any worthy motive for the Baron's entering so warmly into the defence of the measure by such arguments, as necessarily lead to the conclusion, that, far from being injurious, it is attended with very superior advantages to the patients. This leads us very strongly to doubt the truth of the statements with regard to the proportion of men lost.

I have thought it proper to point out these particulars to the reader, to put him on his guard against other statements of the same nature which he may meet with. On the whole, however, notwithstanding a tolerable proportion of disgusting egotism and vaunting, the book, as a system of military surgery, and containing considerable information on many diseases not common, is an undoubted acquisition to the medical world. It is greatly to be regretted that we have not a system of English military surgery, to lay before the world the practice of our own medical officers in both departments of the service. The art of medicine would be considerably enriched by the communication of their long and extensive labours and observations; and the proud boast of the Baron Larrey, 'that the French surgery is superior to that of all other nations, even the most civilized,* would be brought to that test, which would decide between the rival nations, the claim of pre-eminence.

I am happy to see that something of this kind is promised from a quarter so respectable. A work on gun-shot wounds, by Mr. Guthrie, a Deputy-Inspector of military hospitals, which has just made its appearance, is, as I am informed, the first of a series which that gentleman is preparing, and which will form a complete system of military surgery. Mr. Guthrie, in tracing out the practice of the surgeons serving in the late glorious campaigns in the Peninsula, has contrasted, with considerable

* Vide page 173.

judgment and ability, the practice of both nations, and particularly in the article of amputation, on which M. Larrey seems to rest his chief claims to superiority.

The English surgeon will probably be surprised to find that the practice of healing by the first intention the stumps of amputated limbs, the superior advantages of which so many years experience has firmly established in this country, is not yet introduced into the practice of our rivals, who, with so little modesty, claim the pre-eminence in science. It may, however, be the case, that this practice in England is sometimes carried too far; as, when the parts to be operated upon are already in a state of disease, which in military surgery is not an uncommon occurrence, though it seldom perhaps happens in private practice: in this case the adhesive plasters might often be omitted with advantage. The manner in which the ligatures upon the arteries are recommended to be left, that is, cut off on a level with the edges of the stump, is certainly extraordinary. A practice I know has lately been introduced into our armies, of cutting off both ends of the ligatures close to the knot, and leaving them to find their way out afterwards as they can, which has not, as I have learned, been ever attended with any disagreeable consequences. M. Larrey's method, however, is attended with all the disadvantages of a long ligature, without any of the advantages of the method above stated, while at the same time there is always a risk of the short ligature being left in the wound, as he acknowledges to have several times

happened, and which must give much more trouble than when the knot only isleft behind. The method most commonly practised in our service, however, I conceive to be preferable to either; this is, to employ a very small round ligature of not more than two or at most three threads, and for the small vessels only one, and to cut off one only of the ends close to the knot, leaving about two inches of the other hanging out of the wound: it is very seldom that any accident happens from this practice. The surgeon not accustomed to so small a ligature, is apt to be fearful of its strength; but experience has proved, that a single thread is strong enough to hold the femoral artery, nor is there any danger of its cutting through the coats. The only thing to fear is, that it may break while making the knot; so that it may be more advisable, in tying up this artery, to employ two, or even three threads.

The reader will perceive, however, that there are some remedies employed with the greatest success, in diseases very difficult of cure, by the French surgeons; such as the actual cautery, and particularly the moxa, of which our author has availed himself to a great extent. This remedy, scarcely known in our country, has been productive of the most beneficial effects upon the Continent, and is in high esteem. The moxa is an Indian plant, the leaves of which furnish a kind of cotton, which is formed into a small cone, or cylinder, and being lighted at the top, is suffered to burn down to the skin. The pain arising from the application of this remedy is very trifling, and very little soreness of the part

remains. It would seem that any other cotton would answer the same purpose, that could be made to burn in the same gradual manner.

In the long debated question respecting the proper time for amputating in gun-shot wounds, M. Larrey has very clearly and satisfactorily proved, that the practice, which for years past has obtained universally in our service, of operating before the appearance of the primary symptoms, is by far the most safe and successful. It is to be hoped that the prejudices on this subject, which have arisen in the first instance from reasoning *a priori*, (a method always erroneous in medicine), and which have been since supported by the authority of a great name, (Mr. John Hunter,) will yield to the accumulated experience of French and English surgeons, and the question be no more agitated. The amputation on the field of battle, so unjustly dreaded by the venerable surgeon above mentioned, has been the principal cause of the great success of our military surgery on the Peninsula, which is perhaps unequalled in the annals of war. The success attendant on the practice of the French surgeons in their early operations, has been likewise equal to our own; and the modes adopted by them of administering prompt assistance to the wounded on the field of battle, are entitled to our admiration.

I cannot omit noticing what I consider a practice well worthy our adoption. We find M. Larrey, in whatever part of the world the armies may chance to be stationary, opening a course of instructions in military surgery and anatomy, and giving clinical

lectures in his hospital. What an advantageous thing it would be to the junior officers of our service, and to the profession at large, to form a medical school, wherever there existed a large military or naval hospital!

"Fas est et ab hoste doceri."

It is hoped that on the whole the present translation will be found to give a faithful, though somewhat abridged copy of the memoirs of military surgery of the Baron Larrey; a work, notwithstanding its blemishes, of considerable value, as containing a great proportion of practical and experimental knowledge, the only thing by which the science of medicine ever has been, or ever will be benefitted.

CAMPAIGNS

OF

EGYPT AND SYRIA.

SECTION I.

HAVING received an order from the government to proceed immediately to Toulon to join the expedition under General Bonaparte, destined to act in the Mediterranean, and to provide as quickly as possible a sufficient number of medical officers, and whatever should be necessary for so important a service; I sent letters to the medical schools of Montpellier and Thoulouse, begging them to furnish me, without delay, a certain number of surgeons, well informed, courageous, and capable of supporting long and painful campaigns. This invitation was no sooner known, than the honour of sharing our dangers and our glory became the subject of competition among the students. In a short time a hundred and eight surgeons, including those from the army of Italy, were united under my orders, independent of the regimental medical officers.

These were employed during our short stay at Toulon, in preparing the cases of surgical apparatus necessary for the army; while I was getting ready a number of flexible litters proper for the conveyance of wounded men in all situations, and providing a suitable equipment of surgeons' instruments.

On the 13th of May, 1798, the order was given for em-

barkation, and having placed the most material objects of our department on board a vessel intended for that service,* we hastened to arrange the embarkation of the medical officers, so as to divide them properly amongst all the ships of the squadron. Each of these divisions of our staff was provided with one or more cases of surgical apparatus, a medicine chest, and a case of instruments; that in case of an action at sea, they might assist the surgeons of the fleet, or in case of landing they might the more easily follow the movements of the divisions to which they were attached. In short, such was the arrangement of this division, that every ship in the convoy of a hundred men, had a medical officer on board.

General instructions were issued to the medical staff relative to the preservation of the men's health at sea, and to the steps necessary to be taken in conjunction with the surgeons of the fleet in case of action; likewise with respect to the conduct they were to observe while marching with the troops when landed.

On the 19th of May the whole fleet went out of the Roads, passing in review before the *Orient* ship of the line, in which were embarked the Commander-in-chief Bonaparte, Admiral Brueix, the principal members of the commission of arts, and the whole staff, including the physician and surgeon-general.

The fleet appeared off Malta on the 10th of June, which place surrendered after little or no resistance, and on the 18th sailed again for Alexandria, where it arrived in twelve days. During the passage I had been studying on board whatever could throw light upon the system of medicine adapted to this country, and prepared a memoir of instructions and regulations for my colleagues, relative to their future service, to the effect of the climate of Egypt on the constitutions of newly arrived Europeans, and to the

* This vessel being taken by the English, our hospitals were reduced to great want of all necessaries on their first establishment.

pestilential carbuncle, one of the principal symptoms of the most grievous disease with which we were attacked in this warm country.

The town of Alexandria was carried by assault after a few hours fighting. Two divisions of ambulance* followed the two wings of the army, whilst I remained with a third in the centre near the Commander-in-chief, that I might be ready to receive orders, and to observe the movements of the other two corps of ambulance, in order to give the most prompt assistance to the wounded. This day furnished us with about two hundred and fifty, amongst which were the Generals Kleber and Menou, and the Adjutant-General Lescale. I ordered all the wounded men to be conveyed to the convent of Capuchins, which became in the end a very considerable establishment. A number of the wounded required operations, which were performed on the spot, or as soon as removed from the ground. It was here that I first observed the favourable influence of the climate on wounds, which I shall have occasion to speak more of at the end of this first campaign.

Some of the troops who had bivouacked among the ruins of Alexandria, were stung by scorpions of a size much larger than any in Europe. This however caused more fright than mischief to the soldiers, for the effects of the sting were but slight, and easily remedied by the application of sea water, of some acid, or alkaline substances.

I had, together with my colleague Desgenette, organized and established the permanent hospitals; I likewise appointed a corps of ambulance to each of the five divisions of the army, keeping near my person at head-quarters, a

* The term ambulance, which so often occurs in the course of this work, signifies a division or corps of medical officers, accompanied with proper subordinate assistants, and provided with litters, carriages, and other accommodations for dressing wounded men on the field of battle, or carrying them off afterwards. Each of these corps of ambulance consists of about 340 men, of which fifteen are medical officers.

corps de reserve of surgeons, which constituted the sixth corps of ambulance.

On the 6th of July the army moved towards Cairo; and the command of Alexandria devolved on General Kleber. The direction of my department in the hospitals I confided to M. Maselet, surgeon of the first class, a young man of uncommon merit, who died a short time after of the plague.

The division of Dessaix formed the advanced guard of the army. That of General Dugna took the route along the coast, and made itself master of Rosetta without resistance. The main body of the army was engaged in the vast extent of parched deserts which border on Libya, without provisions, without water. It was only on the fifth day of their march that they arrived at the first place in the interior of Egypt, which offered them any resource (Damanhour). Never did an army experience such great vicissitudes, or such painful privations. Suffering from the darting rays of a burning sun, marching (all on foot) over a still more burning sand, traversing immense plains scorched to a frightful degree of dryness, where a dirty ditch of muddy water could rarely be met with, and that almost in a state of solidity: the soldiers, even the most hardy, sinking under the pain of thirst, and overpowered with the heat, were falling under the weight of their arms.

Plains of water, (the effect of *mirage**) appeared to offer the happy termination of our woes; but, alas! it was only to plunge us in still deeper misery, from which resulted a depression of spirits and prostration of strength, which I have seen carried to the utmost extent. Being called too late to many of them, my assistance has become of no avail, and they perished, as by extinction.

* This phenomenon has been recorded by many travellers in the deserts, an explanation of it is given by M. le Comte Senateur Monge *(Decade Egyptienne.)*

This death appears to me very comfortable: one of them said to me at the last moment of his life, that he felt himself inexpressibly happy. I have however restored a great number by administering a little fresh water, sharpened with a few drops of spirits of wine sweetened with sugar. I have likewise employed with success, a little of Hoffman's æther, with sugar.

Legions of Arabs followed our march, and harassed the troops detached from the main body. Woe be to the soldier who quitted the line; he was instantly killed or carried off. A surgeon belonging to my corps of ambulance, was amongst the first of these victims.

The possession of Damanhour brought a sweet consolation to the drooping spirits of our troops. They found there water and refreshments, and had beside the assurance of falling in with the Nile the next day. This first moment of repose restored their strength and courage, and quitting this place, their former fatigues were no more felt. We dressed the few wounded men we had at Damanhour, from whence I had them transported to Rahhmanieh.

On departing from Damanhour, the hollow square of the head-quarters where I was with the wounded men, was attacked on all sides by a large body of cavalry, consisting of Arabs and Mamelukes, and would undoubtedly have been cut to pieces had it not been for the prompt assistance we received from the division of Dessaix, and the vigilance and ability of Colonel Dupas, who then commanded the guides of the army.

On arriving at Rahhmanieh, the sight of the Nile made a most lively impression on all of us; every one ran to plunge himself into it in order to quench his thirst. From this time our marches were less painful, and the burning heat more supportable. Every night on halting we all bathed in the river, which greatly relieved our fatigue, and fortified onr muscles.

We were here joined by the flotilla, which proceeded up the Nile, and continued our march afterwards together as

circumstances would permit. The troops continued advancing towards Cairo, on the western bank of the river, where we found abundance of water-melons, which constituted the principal nourishment of our soldiers.

On the 13th, at day-break, near the village of Chebreisse, we found ourselves in sight of the Mameluke army ranged in order of battle. A smart action ensued, which cost them a great many men, and gave us about twenty wounded, who received immediate assistance.

The flotilla likewise met with some resistance at this village, and had a few wounded, among whom were two officers of the staff. On the third day we fell in again with Mamelukes, who were encamped between the Pyramids and the Nile. They shewed the most determined resolution to engage us, and were the first to give the signal for action. This action was bloody, and occasioned a considerable loss to the Mamelukes, who at length took to flight in two divisions, one towards the Said, and the other towards the frontiers of Syria.

About two hundred and sixty of our brave men were dreadfully wounded: these were conveyed to Gizah, where a superb hospital was established for them, and every care given to them.

On the 25th of July the troops entered Cairo, where we found considerable resources for the establishment of our hospitals. The wounded and sick were soon after removed hither from Gizah.

Two divisions of the army were now dispatched from the main body, one to Upper Egypt in pursuit of Mourad Bey, the other to Damietta to obtain possession of that place; and on the 5th of August I accompanied the Commander-in-chief in his pursuit of Ibrahim-Bey and his Mamelukes, who had retired into the province of Chauquieh on the route to Syria. The direction of my department at Cairo was left to M. Roussel, surgeon of the first class.

Ibrahim-Bey, though flying before us, was overtaken

by means of three days forced marches at Sâlehyeh, just as he was entering the desert. The cavalry, which formed the escort of the Commander in Chief, rushed with impetuosity upon the Mamelukes, and a severe action ensued, which cost us a few killed and fifty wounded. These were dressed upon the sand, and sent afterwards to the mosque of Sâlehyeh which became an hospital. Almost all these wounds were the effects of cold steel; and here we felt for the first time the terrible effects of the Damascus blades of the Mamelukes. Some of our men had their limbs cut entirely off; others had extensive portions of the cranium, of the shoulder, back, and thigh, completely severed. Among the most remarkable of these wounded, was the chief of brigade of the 7th regiment of hussars, Destrés. Besides seven deep wounds of the sabre, two of which were in the shoulders, dividing the muscles and a part of the bones, a third in the back with a division of the muscles, and of the two spinous processes of the vertebræ, he received a ball which was lodged in the breast, and produced a great effusion of blood, so that I was obliged to perform the operation for empyema previously to my departure for Cairo. This cure may be justly considered as an extraordinary phenomenon.

In some of these patients I was under the necessity of employing sutures; in others, uniting bandages, and in others the trepan. I shall have occasion to expatiate hereafter on the case of one of these men, in which I extracted the head of the humerus and preserved the arm. In the general way these patients were speedily cured, excepting only four who died with tetanus, which we shall notice by and by.

On our return to Cairo, the Commander-in-Chief received the news of the defeat of the squadron, anchored at Aboukir, by the English.

At Cairo I organized the medical staff, and established in the principal hospital a practical school of surgery, for the instruction of the younger surgeons of the army; and

directed my attention particularly to the treatment of the wounded, and of the men affected with ophthalmia, which now began to make great progress; it being the season of the overflowing of the Nile. The division of Dessaix, which remained a long time embarked upon this river in Upper Egypt, produced a great number of ophthalmias.

The physicians and surgeons of the army differed greatly among themselves, respecting the cause of this disease, and the manner of combating it. The empirics of the country, pretending that they alone were competent to treat this disease peculiar to their climate, imposed on the credulity of many of the military, which caused the loss of sight to many of them. These motives induced me to address a memoir to my colleagues, on the mode of treatment necessary to adopt in this malady, which I communicated to the institute of Cairo. I shall here subjoin the substance of that memoir, with some additions which I have since had occasion to make. The principles delivered in this memoir were put in practice after its publication, with such success, that this disease became in the end, even in the hands of the youngest branches of the profession, the most simple and the most easy to treat.

Memoir on the Endemic Ophthalmia of Egypt.

The eyes, after having been all at once struck with the ardent light of the sun, whether directly, or reflected from the white ground of Egypt, were the organs that first suffered from the sudden check of the perspiration of the skin: the consequence of which has been an obstinate ophthalmia, and in a great number of cases, total blindness. I am now about to describe the symptoms which it has presented to us; which are puffiness of the eye-lids, enlargement of the conjunctiva, and sometimes of the membranes of the eye itself: pain of the part extremely severe, which is by the patient referred to grains of sand: (this

arises from the turgid vessels:) a dimness of sight and the impossibility of supporting a strong light. To these symptoms, which first occur, succeed in a short time violent pains of the head, vertigoes, and watchfulness. The few tears that are secreted are of an acrid quality, and irritate the eye-lids, and the *puncta lachrymales*. All these symptoms become more violent, and are often succeeded by fever; and sometimes even by delirium. On the third or fourth day the disease arrives at its height; in some cases sooner, in others later. Like all inflammatory affections it goes through its regular stages.

Sometimes indeed it assumes more of a serous aspect: it then unfolds itself more slowly, and gives less pain: the redness is less apparent, and the vessels of the conjunctiva are of a yellowish colour; the eye-lids become oedematous, and there is a greater abundance of tears: the skin of the patient becomes of a swarthy appearance, and the tongue is foul; which symptoms give just reason to suppose the disease to be symptomatic, or of a serous nature.

The termination of this affection is various. Whilst the disease is inflammatory, and is left to the resources of nature, there commonly form about the sixth or seventh day, several points of suppuration on the edges of the eye-lids on their interior surfaces. This ulceration extends by degrees to the tunica conjunctiva, attacks the transparent cornea, and often perforates it. Sometimes the cornea all at once bursts, of which I have seen several instances. The rupture took place within the first four and twenty hours, while the tunica conjunctiva was hardly yet grown red. It would be difficult to assign the reason of this sudden and spontaneous rupture. The opening which it leaves is of a circular form, and nearly equal in diameter in all the subjects where it occurred. A portion of the membrane of the iris passes out at this opening and forms a kind of hernia, known by the name of *staphyloma*. The tumour itself is of a light grey colour: the iris is always darker. This tumour is extremely sensible to the touch of external

bodies, even the lightest; and is irritated by the friction of the eye-lids. The sight during the first few days is more or less obscure, in proportion as the pupil happens to be more or less covered: but in general the *staphyloma* diminishes by degrees, and retires into the anterior chamber of the eye: the membranes in the mean time resume their proper positions. Sometimes a small portion of them remains outside, which becomes strangulated by the closing of the opening, loses its sensibility, and acquires a hardness of consistence. Or sometimes it remains bloated, and divides into lobes: it then assumes a carcinomatous character, especially if complicated with any venereal affection.

When the *staphyloma* returns of itself, the opening in the transparent cornea closes in consequence of the subsiding of its edges, and leaves a small opaque and indented cicatrix, which at first intercepts the rays of light.

In some cases, a displacing of the crystalline and vitreous humours succeeds to that of the iris: their membranes undergo an alteration, and are reduced by suppuration; the eye becomes disorganized and loses its functions. This is observed in many of the inhabitants of the country, especially the poorer sort, who sleep almost naked on the ground, exposed to the night-dews, are badly fed, and feel all day long the effect of the burning rays of the sun, without taking any pains to prevent it.

The *hypopium* has rarely occurred as an effect of ophthalmia, and has presented nothing particular. It is indicated by an opaque point in the transparent cornea which deranges the passage of the visual cone. This point gradually increases, extending itself over the surface of the eye. A slight fluctuation is to be felt with the extremity of a probe, which circumstance distinguishes the *hypopium* from the *pearl* or *albugo*.

The albugo has been frequent: it occupies a point, or the whole extent of the transparent cornea: in the first instance the patient can see a little, but in the latter case

is quite blind. This only happens at the end of the disease, and follows its usual course.

When the patient is of an irritable habit and the ophthalmia of long standing, the thickening of the conjunctiva becomes considerable; it then forms a sort of bolster around the cornea, and passes out beyond the eye-lids; these at the same time turn up, and swell, and present a great resistance to the reduction.

The tarsal cartilages seldom partake of the inflammation: when this accident does occur, the lachrymal channels become destroyed by the ensuing suppuration, and the eyelids retract. Loss of sight almost constantly follows from the inflammation, which in this case succeeds in the globe of the eye: of this I have seen several instances.

The inflammatory species of this disease, unless very slight, very seldom terminates in resolution, without the assistance of art. It is not the same however with the serous kind, that may terminate by perspiration, by a profusion of tears, or by diarrhœa. Ophthalmia in general weakens the organ of sight, and leaves a disposition to cataract, to fistula lachrymalis, to gutta serena, and not unfrequently is followed by nyctalopia. Many individuals who had been affected by the ophthalmia fell into these last diseases.

The principal causes of ophthalmia are the following: the refraction of the sun's rays, by the whiteness of the bodies scattered over the soil of Egypt, which greatly fatigues and irritates the eye; the immoderate use of spirituous liquors and of women; the dust driven about by the air, which gets implicated between the eye-lids, and creates more or less irritation; and more especially the suppression of the perspiration of the skin, by the suddenly passing from heat to cold; with the humidity and coldness of the nights whilst the troops are bivouacking. The sudden suppression of diarrhœa likewise produces the same accident, as we had occasion to remark at the conclusion of the campaign of Sâlehyeh.

I have observed that persons of light complexion are more liable to it than those who are brown. I have likewise noticed that the right eye was more grievously affected with it than the left: almost all those who have lost one eye only, have lost the right.

This disease is more frequent during the overflowing of the Nile than at any other season.

Ophthalmia, if not neglected, and if treated according to the rules of art, is not attended with dangerous consequences: but the blind confidence of the soldier in the remedies of empirics, and his little attention to the regimen prescribed when under the direction of the surgeon, often rendered our efforts unavailing. If the patients are at the time of the attack affected with any particular evil, such as the venereal disease, the consequences are more serious and more rapid. It then shews itself by particular symptoms: the redness on the borders of the eye-lids is brighter, and the pus which oozes from them is greenish, as in gonorrhœa; it excoriates the parts which it touches, and the patient suffers much more during the night. It is particularly necessary to be assured of the true cause of this complication.

The treatment must depend on the nature of the disease and on the principal effects which result from it. I shall lay down the means we have found most successful in each kind.

When the disease is inflammatory, blood taken from the veins of the neck, the arm, or foot, will be useful in the beginning: this must be repeated according to the habit of the subject, and the degree of the inflammation. Leeches will afterwards be of use, applied to the temples, as near as possible to the eye. In case of not having them, scarifications should be made in the same parts, which I have observed to produce the best effects. To these methods may succeed bathing the feet with warm water; directing the steams of a boiling decoction of anodyne and emollient substances to the eye; lotions of a strong decoction of

linseed, poppyheads, and oriental saffron, taking care to apply them as much as possible between the eye-lids. Externally applied, they increase the œdema; poultices particularly produce this inconvenience, and besides hurt the eye by their weight.

Whites of eggs beat up with a few drops of rose-water, and a few grains of alum and camphor, spread upon tow, and applied to the eyes at night, soothe the pain, and diminish the inflammation.

To assist these topical applications, the patient should take freely of cooling and acidulated drinks. If any symptoms of foul stomach appear, some purgative substance may be added to these drinks, sharpened with a little of the antimoniated tartrite of potash. At night a little anodyne emulsion should be given, a proper diet observed, perspiration kept up, and the light excluded. In proportion as the inflammation and tumefaction subside, the collyria may be strengthened with a few drops of acetite of lead, or with a slight solution of oxygenated muriate of mercury, and of sulphate of copper, the quantity of which should be gradually increased.

When the resolution of the inflammation is begun, a decoction of the cort. granat. or a slight solution of the sulphate of zinc may be employed. A bitter and laxative drink should be likewise substituted for the cooling drinks given before.

Should, however, the swelling of the conjunctiva not give way, and it become puffy, some scarifications should be made in it with a lancet: the most prominent parts of it may likewise be removed. If the eye-lids should turn up, and form a bolster around the eye, which not unfrequently happens, a number of incisions ought to be made in the direction of the eye-lid, taking care not to injure the tarsal cartilages. Astringent collyria are likewise in this case to be employed for some hours, and the reduction of the eye-lids attempted, taking the precaution to anoint them first with a little cerate, and to avoid injuring the globe.

They should be retained in their situation with a bandage, and the patient enjoined strict repose. This operation, which has always succeeded with me, requires a little practice.

Should these means prove insufficient, the projecting portion of the conjunctiva should be extirpated, sparing as much as possible the tarsal cartilages. The eye-lid in time will subside and resume its proper form.

Ulcers of the eye-lids ought to be treated with desiccative and slightly escharotic substances. We have employed, with great success, in this instance, the following ointment.

℞. Cerat ex cerâ virg. et ol. amygd. dulc, ℥j.
Oxyd. hydr. rubr. purif. et porphyris. gr. iv.
Tuttiæ præparat. gr. xvi.
Camph. (vitello ovi solut.) gr. iv.
Coccinellæ loch. gr. viij.
Croci oriental. pulverizat. gr. vi.
Misceantur et terantur simul in mortario marmoreo.

A small quantity of this ointment is put on the edge of the eye-lids going to bed, and the eyes afterward covered with a bandage moderately tight.

The treatment of ulcers and specks of the cornea should only be undertaken when the inflammation of the conjunctiva is entirely dissipated. Fumigations with the red oxide of mercury, or the immediate application of some slight caustic, are generally sufficient to remove them: sometimes, however, it becomes necessary to pass a seton through the neck.

The reduction of the staphyloma should never be attempted during its increase: it ought always to begin spontaneously, and then we may second the efforts of nature in reducing it, by a gentle pressure methodically made. If the tumor loses its sensibility and remains protruded, it may be extirpated with a small pair of curved flat scissars.

I have only had occasion to perform this operation twice: in both cases the organ recovered in part the use of its functions.

In case of ophthalmia kept up by venereal disease, the syphilis must be destroyed by internal remedies, particularly by sudorific and depurative syrups, to which should be added a proper proportion of the super oxygenated muriate of mercury. Some mercurial substance ought likewise to enter into the collyria.

If the ophthalmia is the effect of a sudden suppression of gonorrhœa, after appeasing the local irritation by means of scarifications of the temples and anodynes, the person should be inoculated for a fresh gonorrhœa, or an alkaline injection should be thrown into the urethra, which will supplant the original inoculation. This method has succeeded with me in a great number of analogous cases.

If the disease arise from an affection of the stomach, it will demand a different treatment. Bleeding is not indicated here. Leeches or scarifications to the temples may be necessary. Hot wine and repellent collyria ought to be immediately employed, and a vomit or two followed by purgatives; and bitter drinks should be administered. If these fail, blisters may be applied to the back of the neck or behind the ears.

During 1798 the ophthalmia has scarcely spared any: most of the cases were inflammatory, and some ended unfortunately. In the course of the year 1800, few of the troops were affected by it; and I observed that in most instances it was symptomatic and less obstinate. It was likewise more easy of cure.

What are the causes of this difference? I believe they are owing to the painful marches of 1798 and 1799, amongst sandy deserts, deprived of water; and where the troops passed at once from the scorching heat of the day to the cold humidity of the night, without great coats or blankets. Since that epoch they have carried with them the necessary clothing; taught by experience that this was the only

means to preserve them from so cruel a disease. These precautions, together with their being inured to the climate, have preserved the troops from this affection during the last year.

In the commencement of the year 1800, the army marched to repel the English, who had effected a landing at Aboukir. The overflow of the Lake Madieh, whose waters were washing the ruins of Alexandria, increased greatly the aqueous emanations, and rendered the nights more moist and cold; and in the space of two months and a half more than three thousand men passed successively through the hospitals. The disease presented itself under different characters, but it was in general of the inflammatory kind; the symptoms however less severe than during the first year. In some it was complicated with catarrhal fever, or with scorbutic affection. These affections were combated accordingly. In all the cases, topical bleeding produced the best effects. General bleeding was not found at all admissible. Regard was had to the state of the stomach; and to the diseases that were complicated with this affection, the treatment pointed out in this memoir was observed, and with complete success: so that of more than three thousand cases of ophthalmia, not one person lost his sight.

The English on their arrival were not exempt from this malady: after some time they pursued the treatment laid down in this memoir, which they found in the hospital at Rosetta; and from that moment they preserved the sight of the greatest part of their patients.

Several Frenchmen who escaped from this affection, were struck immediately on returning to France, with a blindness more or less complete, which appeared to be owing to a paralysis of the visual organ, in consequence of the sudden change of climates in the most rigorous season of the year.

In order to be secure from the ophthalmia in Egypt, it is necessary to avoid the direct impression of the light and

the dust during the day: at night to be covered from head to foot, to put a bandage over the eyes, and to avoid as much as possible damp and marshy places; to keep up the perspiration, and encourage sweat by the Egyptian baths during the fine season; and by exercise. It is necessary to avoid wine and strong liquors, heating and indigestible aliments; and to fortify the stomach, (which always has a tendency to debility in so hot a climate), by the use of tonics, especially coffee and a bitter infusion: in fine to wash the eyes and the whole head often with warm water and vinegar.

SECTION II.

The ophthalmia having subsided, we began to enjoy, at length, a little quiet and repose; when on the 21st of October, 1798, the inhabitants of Cairo, instigated by a number of Mamalukes who had concealed themselves in the town, formed the horrible project of rising upon and murdering all the French. The signal for revolt was given, and all hastened to furnish themselves with such arms as they could procure, and rushed with impetuosity upon the French. The beating of the general advertised us of our danger, and our battalions soon attacked, and pursued with vigour, this lawless band; part of which took to flight, while the most obstinate and determined of them took refuge in the great mosque, from which they were only forced by a bombardment of twenty-four hours. General Dupuy was amongst the first victims: he was killed by a thrust of a lance. I repaired as soon as possible to the hospitals, in order to assemble my colleagues, and to be ready to render the most prompt assistance to the wounded. But what was my astonishment and horror, when, arriving at the

door of the first hospital, I found the mangled bodies of two worthy colleagues, Roussel and Mongin, surgeons of the first class, who with many brave soldiers had been murdered in attempting to defend the hospital. I myself ran the greatest risks on this eventful day, which gave us forty wounded men.

A number of these were attacked with a fatal tetanus, which exhibited appearances different to what I had observed in other parts of the world. I shall treat particularly of this disease, as the consequence of wounds. (*Tetanus Traumaticus.*)

All the means recommended for this disease proved unavailing: these wounded men who were attacked with it all died, from the fourth to the seventh day from the attack: but this affection, resulting from other circumstances, furnished me with the opportunity of observing more at leisure its progress and its consequences; and after a number of exact investigations, I insensibly arrived at the means of saving some of the military, whom the horror of the disease, and the fatal example of those who had been attacked with it, had almost driven to despair.

Memoir on Tetanus Traumaticus.

Tetanus is divided by authors into trismus and tetanus, and this last has received the names of emprosthotonos, when the body is bent forwards, and opisthotonos when bent backwards. It may beside be distinguished as acute or chronic, according as its progress is more or less rapid. In the first case it is exceedingly dangerous, and most commonly fatal. In its chronic form it is less violent, and on account of the slow progress of its symptoms, it admits of the application of greater resources. In considering the principal phenomena which it presents in its different degrees of violence, we shall confine ourselves to the appearances it exhibited in Egypt.

This affection has in general been the result of wounds inflicted on parts where any of the principal nerves passed; or on the joints; and has mostly occurred in those seasons, wherein the temperature suddenly passes from one extreme to the other; and in damp situations, particularly in the neighbourhood of the Nile; or of the sea. Persons of a dry and irritable temperament have been most exposed to it.

This disease begins by a general uneasiness, and sort of restlessness, which takes possession of the patient: the suppuration of the wound suddenly diminishes, and at length totally ceases. The surface becomes puffy, and dries up: it is at first red and afterwards marbled. This phenomenon is accompanied with acute pains, which are increased by the contact of the atmospheric air, and by the slightest touch of external bodies. This pain continues to extend along the course of the nerves and blood-vessels, until the whole limb is affected. The wounded parts inflame: the muscles are seized with convulsive twitchings, accompanied with, or preceded by, violent cramps, and subsultus tendinum.

The muscular irritation extends rapidly from those in the vicinity of the wound to the most distant, which contract with great violence and become stiff: or sometimes it shifts in a moment to the muscles of the throat and of the jaws, where it fixes. These gradually come together, and at length are so firmly closed, that little or no separation of them can be effected. Deglutition becomes difficult, and in a short time impossible, on account of the forcible constriction of the pharynx and oesophagus.

When the tetanus become general, all the muscles are affected at once. The eyes become in a state of perfect immobility, appear sunk in their orbits, and swim with tears. The face becomes flushed, the mouth distorted, and the head inclined differently, according to the species of the tetanus. The parietes of the abdomen is pressed towards the spine, and acts upon the viscera of that cavity,

which appear driven into the hypochondria, where they are more or less compressed by the repeated action of the muscles. The excretions are all diminished or suppressed, especially the stools. The ribs to which the abdominal muscles are attached are dragged down; the breast is straightened; the expansion of the diaphragm is confined; respiration becomes short and laborious; the heart becomes, as it were, tight and stiffened, like all the other muscles; its contractions are frequent and imperfect, which necessarily weakens the circulation. The functions of the brain, however, remain uninjured to the last moment of existence; so that the unhappy patient in this disease sees himself dying.

I do not wish to hazard any opinion on the want of communication between the brain and the affected nerves. It would seem, nevertheless, to prove that these nervous cords are not actual prolongations of that organ, as Dr. Gall is of opinion.

In a complete tetanus the limbs become straight and so stiff, that the body may be raised up by one of its extremities like an inflexible mass. The patient becomes deprived of sleep, and while he dozes is annoyed with uncomfortable dreams: he feels in a state of agitation and disquietude; torments himself, and endeavours to release himself from that state of uneasiness, induced by the rigidity of his limbs and the want of play of his organs.

All these symptoms proceed so rapidly, that very often in the space of four and twenty hours, he can no longer swallow, or at least swallows with the greatest difficulty. Sometimes he is attacked with delirium; his pulse becomes small and frequent; a febrile disposition, with partial sweats more or less copious, generally manifests itself towards evening. He grows perceptibly leaner, and experiences excruciating pains. The muscles appear delineated, and the skin cleaves to their surface: the salival glands discharge a yellowish foaming juice, which flows involuntarily from the mouth, deglutition being interrupted. It is then that

the unhappy patient becomes sensible of his situation; and without any interruption of his moral faculties he finishes his melancholy career on the third, fourth, fifth, or seventh day: he seldom arrives at the tenth.

The immediate causes of death may be imputed to the pressure on the abdominal viscera, the derangement which the organs of respiration experience; to the stricture of the heart; and eventually to the congestion of the brain. These appearances are confirmed by the dissection of the dead bodies.

The opisthotonos happens more rarely than the emprosthotonos; and I have observed likewise that it is more speedily fatal. It appears that the forcible extension of the vertebræ of the neck, and the forcing back of the head, produce a strong compression on the spinal marrow, and a permanent contraction of the larynx and the pharynx. I shall relate here a case or two of opisthotonos.

Pierre Genet, serjeant 4th demi brigade light infantry, aged thirty, of a dry and bilious temperament, was admitted into the hospital the 4th of December, 1800, with all the signs of opisthotonos: the jaws were close locked, the muscles of the face permanently and convulsively contracted, the head drawn back towards the trunk, the lower extremities rigid and straight, the parietes of the abdomen pressed towards the spine, the pulse small, respiration laborious, deglutition and speech difficult.

The disease had come on four and twenty hours previous to his admission, and appeared to have been the consequence of a fall upon his nose five days before. The accident had been succeeded by a short hæmorrhage and a slight bruise of the part, but had no appearance of fracture or commotion of the brain.

Opiates and cooling anodyne drinks were immediately given, the warm bath was employed, and emollient applications to the nose. These remedies being repeated without any effect, I advised the surgeon who had care of him to apply the actual cautery to the course of the small sym-

pathetic nerve, and to the soles of the feet. According to the Aphorism of Hippocrates, Sect. viii. *Quæ ferrum non sanat; ea ignis sanat, &c.*, I applied nine cauteries upon him sufficiently large and burning. Their application instantaneously increased the pains and convulsive constrictions of the muscles: those of the larynx, the pharynx, and the mouth, were very violent, and almost suffocated the patient. This crisis was nevertheless followed by a calm, sufficiently great to induce us to hope for success from this method; but in two or three hours afterwards, convulsive movements and violent contractions came on with cold and clammy sweats; in fine, death terminated the sufferings of this patient on the night of the 11th, the seventh day from the accession of tetanus, and the thirteenth from the accident.

Some moments after death the head was strongly drawn back, the spine likewise bent backward, the inferior extremities stiff and stretched out, the superior ones half bent and contracted. A thick frothy saliva came out of the mouth, giving out a nauseous smell. On opening the body, we found the same appearances as described above. I have remarked that gun-shot wounds on the joints, or in the course of the nerves, have often been followed by tetanus without any other visible cause. However, where the wounds have been very slight, the tetanus seems to have arisen from moisture and sudden change of temperature. The wounded men at the battle of the Pyramids, who were attacked with tetanus, were evidently the victims of the moisture and coldness of the nights. Those at the revolt of Cairo were placed in a hospital, whose walls were watered by the Nile, and which remains in that state three months in the year. At the battle of El A'rich, the wounded were placed in tents upon the damp ground, exposed to continual rains: eight were attacked with tetanus, all of which died from the fifth to the sixth day from the attack. At the taking of Jaffa, we lost some wounded men with a tetanus extremely acute; all those attacked with it died in two or

three days. The moxa and the alkalies, which were employed for some, appeared to aggravate the symptoms. It is to be observed, that the hospital was situated by the seaside, and that the weather was rainy.

In the cases where cold contributes to the developement of tetanus, the irritation transmitted by the wound to the nervous system, is without doubt augmented by the suppression of the cutaneous perspiration, which affects the organs, and particularly the parts already diseased. But in general all the irritation concentres either from the first invasion of the disease, or in the end, in the nerves of the neck or throat. Their direct communication with the medulla oblongata and spinal marrow, their numerous connexions and frequent anastomoses, render them susceptible of a very great degree of mobility from the slightest impressions, which immediately induces a contraction of the muscles in these neighbourhoods, in such manner that deglutition and respiration are readily interrupted. The patients then experience, if not a horror at the sight of liquids, at least a repugnance to them, which often hinders the employment of internal medicines: and if the wound is such as to allow of no assistance from art, the patient is condemned to go through the whole circle of painful symptoms which this cruel malady produces. No art can surmount the obstacles which oppose the passage through the alimentary canal. The introduction of the elastic catheter through the nostrils produces suffocation and convulsions. I had occasion to try this method in the case of M. Navalh, surgeon of the second class, who died of trismus, the consequence of a wound in the face, which had fractured the nasal bones and part of the left orbit. On opening the bodies of such as had died of trismus, I found the pharynx and oesophagus considerably constricted, their internal membranes red, inflamed, and covered with a viscous humour of a reddish colour.*

* I have thought fit to subjoin to this place an account of some extraordinary appearances in bodies which had died of tetanus in the island of Barbadoes, which fell under my own observation. The stomach and

Hydrophobia, hysteria, and many other nervous affections, act principally upon these organs, and their result appears to be the same. So I have remarked, that in the highest degree of tetanus, the patients shew a great aversion to liquids; and if forced to swallow them, are instantly affected with strong convulsions.

Experience shews that tetanus left to nature is in all cases fatal; the practitioner then ought to have recourse without delay to such means as the disease indicates, the principal of which are to remove the causes of irritation, and to re-establish the suppressed excretions.

The first of these intentions may be attempted by making suitable incisions about the wound, before any signs of inflammation declare themselves; for if the inflammation is at all advanced, the incisions would be useless and even dangerous. They must also comprise, as much as possible, the nerves and membranous portions within the extent of the wound. But incisions made upon the articulations are pernicious, and appear, in every instance, to accelerate the symptoms of tetanus, of which I have witnessed several examples.

The application of caustic to the wound may be employed with advantage on the first appearance of the symptoms; but the same caution is here necessary as for the incisions. To these operations should succeed venæsection, if admissible, and the topical use of emollients and anodynes, although the effect of these is very inconsiderable.

Internal remedies, whatever may be their properties, are almost always useless, because the patient, shortly after the attack, falls into a state of strangulation. If this however should not take place till near the end of the disease, the practitioner may employ those remedies in which most

whole extent of the intestinal canal down to the rectum, contained an abundance of a viscid tenacious yellow matter, resembling liquid gambouge, which, on being exposed to the air, immediately effervesced, and continued to foam for the space of a minute. This matter, very different from any secretion or excretion in the human body, was found more or less in all subjects who died of tetanus. TRANSLATOR.

confidence is to be had, such as opium, camphor, musk, castor, and other antispasmodics, given in a large dose, and in increasing proportions. These remedies have been employed by us with some advantage in cases to be hereafter mentioned.

A Mameluke of Mourad-Bey, named Mustapha, aged twenty-seven years, of a dry and bilious temperament, on the 19th of April, 1800, received a gun-shot wound which fractured the first phalanges of the fingers of the right-hand, together with the corresponding metacarpal bones, and carried off the thumb at its articulation with the trapezium. Several tendons and ligaments were torn out and lacerated. Mourad-Bey had caused all the care to be taken of him in his power, but as this care was without skill or knowledge, it could be of little avail, and it may be said this individual remained without medical assistance till the 18th of May following, at which time he was placed under the care of the French surgeons.

All the symptoms of tetanus had appeared for three days; the suppuration of the wound was serous and in small quantity, its edges red and puffy, the muscles of the arm were already contracted, and in a state of convulsion, the jaws locked: deglutition was performed with great difficulty, the patient was constipated and in a state of great disquietude.

M. Celliere, under whose care he was placed, first unbound the wound, and proceeded with great caution to remove all the shattered detached portions. He dressed it with emollients, and ordered the patient six grains of opium combined with four of camphor. A few hours afterwards he was a little calm, and the night was passed with less disquietude. His sleep however was interrupted with twitchings in the wounded limb accompanied by severe pains: a perspiration appeared on the superior parts of his body, while the lower extremities remained in their usual state. This amelioration of circumstances induced the surgeon to continue the same remedies, of which he gradually

increased the dose. The symptoms continued to diminish sensibly till the 24th of May, at which period the patient was removed from Syont to Minyet; the obstacles to deglutition having been completely removed, and the excretions in part restored. The burning heat of the day, and the fatigue of the journey, to which probably we may add the coldness of the night, to which he was exposed by sleeping upon the terrace of the hospital, conspired to bring on again the symptoms of tetanus. The same means were repeated, which however did not prevent the disease from going on with its usual rapidity. The warm bath was then had recourse to; and the second bath produced a general relaxation, which allowed the patient to swallow the half of a draught composed of eight grains of camphor, as much musk, and twenty grains of opium, dissolved in some emulsion. During the day he took also the other half; in a few moments after the pains subsided, and the jaws relaxed. During the night his sleep was tolerably tranquil. On the morning of the 19th, a great amelioration of all the symptoms was observed; the suppuration of the wound was restored, the organs by degrees resumed their functions, and the patient was in a few days put in a fair way of cure, which object was at length, by the most assiduous care, and the use of the medicines above mentioned happily accomplished, and the patient on the 29th of June following was returned cured to Mourad-Bey.

M. Lannes, general of division, at the battle of Aboukir, received a ball through the inferior part of the leg, in the space between the two bones. For the first five days he was attended in his tent, and afterwards carried to Alexandria. Although conveyed in a carriage which was suspended and covered, the march was extremely painful and distressing to him. Immediately on his arrival I was called to him, and found him in a state of great agitation and disquietude, shewing great alarm for the consequences of his wound. The leg was tumefied, the wounds dry and painful; he was

assailed by violent startings and twitches through the whole of the limb. The foot was benumbed, the jaws somewhat locked, the eyes haggard, and fever was already kindled.

I allowed him to take some moments of repose, which he requested, under the idea that he should sleep: he was however soon awakened by the pains and the general uneasiness. I dressed him with emollients, and prescribed to him cooling drinks, the utmost quiet, and a low diet. At my second visit, three hours afterwards, I found all the symptoms aggravated. I instantly took some blood from the arm, and administered emulsions, to which were added the purified nitrate of potash, sulphuric æther, the syrup of diacodium, and orange-flower water.

He passed a distressing night, and the next day was still in the same state. The leg was very much inflamed, and the jaws still locked. I repeated the bleeding, and continued the medicines, increasing the quantity of the antispasmodics.

The night was passed tranquilly, the fever subsided, and all the other symptoms were diminishing. A bloody oozing took place from the wound, the spasms ceased altogether, the discharge became healthy and profuse, the excretions returned to their usual course, and sleep was restored; and when I took my departure for Cairo, he was in a fair way of recovery. A short time after, he was in a condition to accompany General Bonaparte to France.

M. Esteve, director and accomptant-general of the public revenues of Egypt, was attacked by a slight inflammatory sore throat, the consequence of a small portion of fish-bone having been fixed in some of the sinuses of the fauces, the smallness of which made it always evade my search. On the thirteenth day from the accident, and the third from the appearance of the inflammation, symptoms of tetanus took place, such as the locking of the jaws, and convulsive motions of the muscles of the face, accompanied with violent pains and stiffness in the muscles of the throat. The pulse was accelerated and thread-like, frequent start-

ings were felt in the upper extremities. A total suppression of stools took place, and a great deal of uneasiness in swallowing or articulating.

The rapid progress of these symptoms made me tremble for the life of my friend. I immediately employed as a drink an edulcorated emulsion, to which I added extract of opium, castor, camphor, nitre, and sulphuric æther, in strong but gradually increased doses, of which he took a glass a time every quarter of an hour. The weak state of the pulse would not allow me to employ the lancet. I applied resolutive cataplasms to the fore part of the neck, and ordered the feet to be bathed, emollient clysters to be given, and the steam of a strong decoction of henbane, of poppies, and marshmallow root, to be received upon the throat, dry frictions to be employed over the whole surface of the body, and every thing to be removed that could disturb the repose of the patient. I followed step by step all the phenomena of the disease.

The following night he was greatly agitated: deglutition was suspended, the saliva flowed from the mouth, and the jaws were firmly locked. The patient experienced a continual and painful agitation. He fell for a moment into a doze, interrupted with slight fits of delirium. Every thing announced the most imminent danger. However about four o'clock in the morning, a soft profuse sweat, which occupied the breast and belly, succeeded to this violent crisis. The patient experienced a degree of calm, and was able to swallow a glass of the above-mentioned emulsion. A second glass increased the perspiration and relaxation of the parts, which made me form a favourable opinion of its effects; for, whenever the perspiration is symptomatic, it commences in the head and in the extremities; whilst, if it is critical, it appears on the breast and lower part of the belly. Next day the jaws were entirely relaxed, deglutition was easy, and the contractions of the muscles much less. Instead of the resolutive cataplasms, I ordered a volatile liniment, and a bitter and laxative drink in the place of

the emulsion, in order to clear the *primæ viæ*, and establish the tone of the stomach. The patient was perfectly cured. The fish-bone appeared to have come away, with a slight discharge which took place in the fauces.

I have remarked, that the patients have shewn less repugnance to the swallowing of emulsions, than of any other liquids: they are more soft and agreeable, and facilitate the effects of the remedies with which they are combined.

Frictions with oil, so much extolled by some writers, were employed in the hospital at Cairo, without producing any sensible change in the state of the patient.

Mercurial frictions appeared to aggravate the symptoms in those cases where they were employed. The use of this remedy, even in venereal cases, requires in Egypt the most cautious attention; for when administered as in Europe, it has given rise to most lamentable consequences, such as madness, hepatic-disease, &c.

Cataplasms of tobacco leaves applied to the wounds have not been followed with any good effect. Alkalies have likewise been used without success. Blisters applied to the throat, in cases of trismus, particularly in one instance, suspended the symptoms.

The moxa and the actual cautery, recommended by the father of physic, were attended with the same result. The moxa was employed at Jaffa in three cases. The tetanus however followed its usual course and ended fatally.

The ordinary causes of tetanus, in hot climates, I conceive to be the contact of cold and moist air to the surface of the wounds; the irritation arising from extraneous bodies, and the repercussion of the purulent matter. The prevention of these causes may be in some measure effected by keeping the wounded men in a temperature sufficiently hot, and always equal, as far as it can possibly be done; by the speedy extraction and removal of all extraneous bodies, by dressing the wound with great tenderness, by covering the surface of it immediately with fine lint, and by not dressing recent wounds until the suppuration is well established.

In fine, by ordering for the patient a proper regimen, and the greatest degree of tranquillity. When this disease is the consequence of the repercussion of purulent matter, blisters applied as near as possible to the wound, or to the wound itself, will recall the suppuration, and put an end to the symptoms of tetanus. I will give here some instances of their success.

Pierre Bonnet, aged 28 years, of a bilious and irritable habit, had been languishing in the hospitals of Cairo since the Syrian campaign, with a fistulous ulcer, attended with caries of the bones which form the articulation of the foot with the leg. It had been resolved in a clinical consultation, that, on account of the disorganization of the foot, and the state of marasmus to which the soldier was reduced, the only means to save his life was amputation of the limb. This was accordingly done on the 21st of September. The success of the operation met with no obstacle; suppuration was established, and the wound looked healthy. Ten days after, the cicatrization began to form round the circumference, and extended itself gradually towards the centre.

Just as the patient approached towards a cure, on the 24th day from the operation, all at once symptoms of tetanus took place, which was undoubtedly the consequence of the sudden repercussion of the purulent matter, which still oozed from the wound. Perspiration was likewise checked, from the imprudence of the patient in walking out in the night. Diaphoretics and opiates were administered in full doses by my advice, and dry frictions all over the body. Nevertheless, the symptoms continued their course, with their usual rapidity. The patient felt most excruciating pains in the epigastric region, and intolerable shootings in the amputated limb. His breathing was laborious, his jaws locked, his head bent down upon the breast, the body curved; in fine, the emprosthotonos existed to its highest degree.

As the opiates could no longer be administered, anodyne emulsions, with antispasmodics, were introduced through an

opening formed by the loss of two of the fore teeth, which at first composed the pains of the stomach. A large blister applied over the whole surface of the stump, in four and twenty hours restored the suppuration, and produced a miliary eruption, which shewed itself on the face and breast. From this moment the patient was better. All the symptoms of tetanus diminished by degrees, the functions were restored, and on the fiftieth day from the amputation he was discharged cured.

Peirre Grangie, at the siege of Cairo, received a shot in the arm which rendered the amputation of it necessary immediately. The wound proceeded without any accident, till on the ninth day, after having been exposed to the damp night air, the patient was seized with all the symptoms of tetanus. The surgeon, who had the care of him, perceiving, that the repercussion of the purulent matter was the cause of these symptoms, hastened to apply to the wound cantharides mixed with basilicon. The patient was ordered a diaphoretic drink, with a strong dose of opium, and camphor dissolved in a glass of emulsion. The symptoms continued four and twenty hours: however the blister restored the suppuration, the perspiration returned, the jaws were relaxed, and the danger entirely disappeared. The patient was afterwards recovered in the usual manner.

The success, as unexpected as complete, obtained by amputating the limb in the person of an officer, who was attacked by tetanus of the chronic kind, leads me to propose a question, whether in this disease, when induced by a wound of the extremities,

"It would not be better to remove at once the wounded "limb by amputation, the moment the symptoms of tetanus "appear, than to wait for the resources of nature and of the "very uncertain remedies we possess, for the cure, which "so rarely takes place?"

If the disease is chronic, as it sometimes happens, amputation may be had recourse to in any period of it, provided that the time of the intermission of its symptoms is chosen.

It will not succeed equally in the advanced stage of acute tetanus, when the muscles of the limb become stiff and contracted as I had occasion to observe in a case at St. Jean D'Acre.

When it is well ascertained that the tetanus is the consequence of the wound, we must not hesitate to amputate on the first appearance of the symptoms. We may be assured that it is traumautic, by observing the nature of the wound and the train of the first symptoms, and by considering the time of their invasion, which is from the fifth to the fifteenth day at latest. It appears that at this time the nervous mobility is very strong. When the suppuration is going on, the stupor quickly disappears, the vessels empty themselves, the eschars fall off, and the nerves enter into a state of perfect liberty. Their sensibility is then extreme, they become susceptible from the slightest impressions of an irritation the most exquisite, which soon extends itself over the whole nervous system. If under these circumstances the wound is assailed by a cold and moist atmosphere; or if there remain any extraneous body irritating the nervous parts now deprived of their eschars, tetanus becomes inevitable, especially in hot climates. It ought likewise to be expected that it should be increased with great rapidity, so that in a short space of time every part of the limb becomes affected, and all the nerves irritated. The effects of this first cause may likewise be complicated with some existing fault in the humors, or with worms in the intestines, as I have seen in one instance at Nice. But in watching attentively the phenomena of tetanus, the symptoms which denote these complications may be easily distinguished, and combated by the means indicated.

The amputation of the limb at the first moments of the invasion of tetanus cuts off all communication between the source of the evil, and the rest of the body. This division likewise empties the vessels, puts an end to the shooting of the nerves, and destroys the convulsive mobility of the muscles. These first effects are followed by a general col-

lapse, which favours the excretions, favours sleep, and restores the equilibrium in all parts of the body.

The quantity of momentary pain caused by the operation cannot increase the existing irration: besides, the pains of the tetanus render the operation more supportable, especially when the principal nerves of the limb are strongly compressed. This assertion is strongly supported by the observations I had occasion to make in the case of M. Bonichon a lieutenant, who received a wound in the foot at the battle of Sedment, on the 7th of October 1798.

On the 19th the lock jaw first made its appearance; all the other signs of tetanus were visible by the 29th, and continued to increase by slow degrees: for this was a chronic case.

The wound was carefully examined, for the purpose of removing any detached substance, that might have been previously overlooked; and opium in suitable doses was prescribed. These means appeared to relieve the symptoms, as they subsided and returned alternately; but these intermissions were of short duration. On the 2d of November the disease was at its greatest height. A convulsive contraction had taken possession of all the muscles of the body, the legs were stiff, and strongly bent down upon the thighs, and these last upon the belly; the parietes of which was forced in upon the spine, the head bent down upon the breast, the arms and fore-arms doubled one upon another, the jaws firmly clenched, and deglutition extremely difficult. The pulse was small and thread-like; the patient was reduced to the last extreme of emaciation; his body was constantly covered with perspiration; and the permanent excruciating pains made him pray for death as a benefit.

After having exhausted the resources of art, I conceived the idea of amputating the limb. The despair of the unhappy patient and the certainty of death under the present circumstances, induced me, contrary to the opinion of many medical officers whom I had called in to a consultation, to have immediate recourse to this last expedient. A mo-

mentary calm which took place the same day was taken advantage of, and the operation was performed with great dexterity by one of the consulting surgeons. The patient, who ardently desired the operation, bore it with great fortitude, and without manifesting any great degree of pain. A slight degree of syncope a few moments after the operation, was the happy presage of a cessation of the symptoms. In short a general relaxation took place, which enabled the patient to swallow some liquids, and he slept well during three hours of the succeeding night. The next day I found his pulse rising, the limbs less stiff, and the jaws relaxed: he had also already passed some stools by the assistance of clysters. The suppuration of the wound was restored at the ordinary time, and all the symptoms disappeared by degrees. Nevertheless the stump, for some days, was annoyed by violent twitches, which were increased by the slightest touch, and especially during the dressings, whatever precaution was taken to prevent irritating the parts. I succeeded in quieting these convulsive movements, by an exact compression made on the course of the sciatic nerve. The patient soon recovered his strength, but the digestive organs remained a long time in a state of atony, on account of the compression they had received from the abdominal muscles.

However about the beginning of December following, this officer was discharged from the hospital perfectly cured.

The battle of the 21st of March furnished the occasion of amputating the limb of a soldier, under circumstances similar to the above, except that the tetanus was of the acute kind. The symptoms subsided as if by magic, and had it not been for the humidity of the ward in which this patient was necessarily placed, and the extreme want of all the means for securing him from the coldness of the nights, this operation would have been attended with as complete success. The patient passed about twelve hours in a perfect calm: but the coldness of the night, which was much

greater than usual, brought back all the symptoms, and the patient died on the thirteenth day from the operation, notwithstanding every means employed for his recovery.

Destaing, general of division, in the same battle, received a shot through the middle of the right arm. A portion of the biceps and coraco brachial muscles, with the radial and internal cutaneous nerve were divided. This wound left a bridge consisting of the teguments, the cellular membrane, and some muscular fibres. The first effects of this wound were, the fall of the sabre from his hand, paralysis of the arm, and a painful agitation which instantly appeared over the whole of the limb, accompanied with a general sensation of anguish and debility, and an uneasiness in the organs of respiration. It was with great difficulty that the general could be transported to Alexandria, where he received the first assistance. I was not called in until the eighth day, when he began to experience very excruciating pains. Although the wound was suppurating, the appetite of the patient was greatly deranged, his sleep was interrupted, and a febrile action came on towards night. I instantly felt the necessity of cutting through the bridge, in which were some nervous branches, but the patient refusing to admit the operation, I was under the necessity of contenting myself with emollient applications, and the internal use of the remedies indicated. I dressed the wound every day, which I continued to do till it was cured. The next day the local pains were more severe, some convulsive movements of the hand and forearm took place, with a general heat over the whole body, and a closing of the jaws. The patient was extremely uneasy, and in a state of continual agitation. The rapid progress of the symptoms determined me to cut through the bridge, and to make incisions in the bottom of the wound, where were some nervous filaments. This operation was attended with great pain, but in two hours the patient was much relieved: and by the assistance of anodyne emulsions, emollient clysters, rest and low diet, all the symptoms disappeared in the space

of two days. The discharge became healthy, the edges of the wound contracted, and the cicatrix was completed towards the end of the siege of Alexandria.

This wound has left the hand and forearm in a state of paralysis: the two last fingers have been also for a long time deprived of feeling.

I regret that I have not a sufficient number of instances of cure resulting from amputation to lay before the reader, but I have enough to draw the following conclusions.

1. That of all the remedies recommended by practitioners, experience has proved to me that the extract of opium combined with camphor and nitre, dissolved in a small quantity of emulsion made of some cold seeds, or of sweet almonds, and given in doses more or less strong, acts by so much the more favourably, as the patients, who have always a great repugnance to any other liquids, swallow this mixture with pleasure; the effects of which are seconded by bleeding where it is indicated, and blisters under the circumstances which we have spoken of.

2. That amputation performed in proper time, is the most certain method to arrest and destroy the effects of tetanus, when it is depending upon a wound which has its seat in one of the extremities.

It is my wish that these observations may fix the opinion of army surgeons with respect to the treatment of traumatic tetanus: that the unexampled success of the operation may encourage them to practise it: and in turning them from a road, where at every step they may fear to meet with death, it may induce them to pursue that in which there still remains a possibility of saving the lives of some worthy citizens.

The result of these terrible diseases and the different battles we had fought, left us about a hundred and fifty

lame or blind whom the commander-in-chief thought proper to send to France, under the command of M. Sucy, the commissary-general, and three surgeons, all invalids. A fatal destiny drove them on the coast of Sicily, where these honourable victims were murdered.

Soon after this circumstance, on the 22d of December, I received an order from general Bonaparte to accompany him with his staff to Suez; where we arrived after three days march, having traversed an immense dry desert, where only one single tree was to be seen. The road through this desert was traced out without interruption by the bones of men and animals of every kind. If the bodies escape the eagles and vultures, who quickly dissect them and transform them into skeletons, the sand and the burning heats dry them up, and reduce them to the state of a mummy. These bones excite the most gloomy ideas in the mind of the traveller: for if he should be destitute of water and provisions, he sees beforehand the fate that awaits him in the midst of a desert to which he can discover no limits.

In traversing these deserts we experienced the extreme difference of temperature between the day and night, during which the cold was so excessive, that it deprived us of sleep. We were obliged to keep ourselves constantly in motion; for no sooner were we asleep than our limbs became benumbed. However necessity producing industry, we contrived to collect heaps of bones together and to set fire to them. We had some trouble at first to make them light, but accomplished it in the end.

The medical correspondence from Alexandria, Damietta and Mansoura, announced to me that a pestilential fever, accompanied with carbuncles and buboes of the axilla and groins, had shewn itself in those towns; and that it was making great ravages, particularly in Alexandria, where many surgeons of the navy had died of it. Two or three accidents of the same kind had already occurred at Cairo.

This disease had attacked a soldier of the 32d demi-brigade, who was received into the hospital with a dark

coloured pimple upon the lip; which in the course of a few hours put on all the appearance of a carbuncle, and destroyed the patient on the third day from its appearance. The body of this patient, which bore indubitable marks of the plague, I ordered to be removed with great precaution; and under the pretence of a malignant fever, directed all his clothes to be burnt; and the furniture of his bed. The apartment, in which he had been kept by himself, I had well aired and perfumed. This event I communicated to no one but to my colleague the physician-general. I was very sure that this man died of the plague, and that the same disease was then raging at Alexandria, Damietta, &c. In consequence of which I addressed a letter to all the surgeons of the first class, inviting them to continue the same zeal and attentions to the patients who should be attacked with this disease, and to use at all times all the precautions in their power to prevent the spread of contagion.

In the mean time orders were given to prepare for the campaign of Syria, and I began to devise the necessary means of transport for the wounded men, which the campaign would not fail to furnish us with. It was not sufficient that they should be dressed upon the field of battle; they must likewise be placed out of the reach of the Arabs, and out of the danger of starvation to which they would be exposed. This could only be effected here by means of camels: I therefore constructed two cradles for each camel, as convenient as they could be made for the wounded men, and sufficiently light for the beasts. These were so constructed that a man might lie at his length in them if necessary. I then organized all the corps of ambulance, and leaving the charge of my department in the hands of M. Casabianca, I set out with general Bonaparte and his staff.

SECTION III.

On the 9th of February 1799, the army set out on its march. The advanced guard on arriving at El-A'rich sustained a severe check, and had nearly three hundred men wounded. I demanded the permission of the Commander-in-chief to quit the main body of the army, to go and render them assistance; and set out immediately upon a dromedary, with an escort across the desert. It was a march of three days, and we suffered greatly from thirst and fatigue. On passing by Quatyeh, where was the first station and first stores of the army, I established a small hospital of about twenty beds, which I committed to the care of M. Andrè, surgeon of the 2d class.

I arrived at El A'rich on the 27th, in the evening. The weather was very wet and cold: I found the wounded men lying in the midst of the camp upon palm leaves, covered by very bad tents, or by branches of the same tree, without being sheltered either from the rain or cold. The wounds were very severe, and almost all required some operation. Of these some were very complicated and difficult: I shall have occasion to give an account of them hereafter. We were in great want here of flesh meat for the wounded, which was now become however indispensable. The French had not as yet tasted the flesh of the camel, but I found it necessary to propose it to the general as the only expedient. The soup and meat of these animals was very nourishing and well tasted; but unfortunately we did not long enjoy this resource, being soon obliged to substitute for it the flesh of the horse, which was by no means so good.

In a few days the Commander in Chief arrived before El A'rich with all his artillery, and the place surrendered after a smart attack of three days. Some of the wounded in this siege were attacked with tetanus, which resisted every effort to subdue it, as the rains had continued during

the whole time, and there was no possibility of guarding against the effects of humidity.

Perceiving some signs of the plague amongst the wounded of the enemy, I gave notice of it to the Commander-in-chief, and orders were given to prevent all communication between our troops and the prisoners. I ordered the carcases of men and horses, which lay putrifying in the fort, to be buried in one of the trenches, and the dirty rags with which their houses abounded to be collected and burned. The insides of the houses were then cleaned, put in repair, and white-washed.

We found in the fort only provisions for a day or two, with which however the army again entered the Desert. The first day's march was entirely lost to us, as the Arabian guides had misled the columns, so that after a march of eight or nine leagues, we found ourselves amongst moving sands only a league from the sea, and two at most from El A'rich. The General however encouraged the troops to support their fatigues, and we came at length within sight of the gates of Syria. These are two high columns of granite which mark the division between Africa and Asia. On the following day we entered the beautiful and rich plains of Palestine.

On the heights, in the neighbourhood of Gaza, the army of Ibrahim-Bey was perceived in order of battle; but as the arrangements for action were making, the whole of this fine body of oriental troops took flight, nor did they halt till at a great distance from Gaza; which town surrendered immediately, and without resistance.

On the 3d of March towards evening we arrived on the heights of Jaffa, and commenced the siege, during which we had a great number of sick, and about thirty wounded. Amongst the former some very sudden deaths occurred, and we discovered on these dead bodies some purplish tumors in the axillæ, and some petechiæ. This assured me of the existence of a pestilential fever, and I made a report of it accordingly to the Commander-in-chief.

Jaffa was at length carried by storm on the 7th of March, which circumstance added to our hospitals two hundred and forty-two wounded men, beside what occurred during the siege. I shall have occasion to speak of their cases hereafter. During the stay of the army in this place, there occurred several cases of plague amongst the wounded, and a great part of the fever patients were infected with it. Every possible precaution was taken to prevent communication with them, and to preserve the rest of the troops from this malady.

The army began its march from this place on the 15th of March. In the mountains of Palestine the division of General Lannes was attacked by some parties of the enemy, and about fifty wounded men were the consequence of it. These we contrived to convey with considerable difficulty over steep mountains and bogs to St. Jean D'Acre, within sight of which we arrived on the 18th of March. The troops were extremely fatigued, destitute of every species of provision, and without the hope of finding any on the next day. The inhabitants fled at our approach, and took refuge in the mountains. The wants of our sick and wounded were very pressing. Some had died of the plague on the march in a manner extremely sudden and terrific.

We advanced along the plain at the foot of Mount Carmel to Caiffa, a small town on the sea coast. Some provisions were here found and distributed to the army and to the sick. We were here obliged to retrograde along the direction of the mountains, making nearly the circuit of the plain, which was at this season impassable, and many formidable difficulties to overcome before we arrived upon the heights of Acre.

The siege commenced on the 20th of March. The water we were obliged to drink in the beginning of this siege contained a quantity of silex suspended in it which proved very pernicious, producing violent colics, obstinate diarrhœas, and disposing the men to putrid nervous fevers. Our men were at first very much incommoded by it; but

we afterwards cut off the aqueduct, which conveyed very good water to St. Jean D'Acre.

The army having taken up a military position, the physician-general and myself were occupied in looking out for a position for our hospitals. The stables of Djezzar were fixed on for the principal medical establishment, being the only place in the neighbourhood where the sick and wounded could be placed out of danger from the besieged enemy. It was however the only advantage which the place offered. The sick were very badly lodged, having no kind of bed furniture; and we were likewise very badly provided with vinegar and medicines of all kinds.

The trenches were opened on the 21st of March, and I ordered a corps of ambulance to be placed in the most favourable situation for giving immediate assistance to the wounded. The regimental and hospital surgeons both undertook this service by turns. The army during the first few days suffered a great deal from hunger; but soon after the Druses and Matonalis, having been informed of our good intentions, brought us all kinds of provisions.

The frequent attacks of contagious fevers which happened amongst the troops, and the various modes of treating them which prevailed among the regimental surgeons, induced me, together with several other reasons, to address to them the following circular letter:—

" Head-quarters before St. Jean D'Acre,
22d of March, 1799.

(Circular letter to the surgeons of regiments.)

" I beg, gentlemen, that you will have the goodness to transmit me a return, every five days, of the number of sick in your respective corps, of the nature of the prevailing disease, together with its progress and termination. This document will be necessary to enable me to make the proper reports to the Commander-in-chief. I hope therefore it will be strictly adhered to.

" Experience has taught me, that emetics administered

on the first attack of the disease, where there exists no turgescence of the blood-vessels, produce the very best effect. In case of the first supposition, however, they ought to be preceded by the application of cupping glasses, with scarifications to the back of the neck, or on the ribs of the breast; and as much blood should be taken as the degree of plethora in the patient indicates. But observe particularly that general bleeding is fatal in this disease. After evacuating the *primæ viæ*, the patient must be plied with drinks acidulated with lemon-juice or vinegar, which must be particularly insisted upon the first twenty-four hours; and the bowels at the same time are to be kept loose.

"I have found, that in case of a deficiency of bark, the bitters which abound in this country, taken in doses more or less strong, in the second period of the disease, and followed by suitable topical applications, will most commonly bring about the re-establishment of the patient, where that is at all practicable.

"The topical applications must be varied according to the external symptoms. If there are buboes, the efforts of nature must be seconded by all the means known to forward suppuration, such as rubefacients or caustics, poultices of squills which abound in this country, and which should be applied very hot, those of the fresh euphorbium, &c. equally common, and which are very efficacious. By these means too the cantharides may be saved, which are nearly expended.

"If the inflammation of the buboes develope itself slowly, it will be necessary to have recourse to the actual or potential cautery. Should a collection of matter form, it must be speedily evacuated by a large incision, and dressed with storax or theriaca. The patient's strength must also be supported by the use of bitters and of coffee: these means are favourable to the crisis of the disease, or to the appearance of the exanthematic eruptions, which take place from the seventh to the ninth day.

"If, instead of buboes, pestilential carbuncles should

make their appearance, which are easy to distinguish from other humours, they must be deeply scarified, the eschars removed as much as possible, and some concentrated acids must be immediately applied to the scarifications; or in case there should be none of these, the juice of the *tithymal*.

"This disease when arrived at a certain height is contagious, for which reason it is prudent to take all the precautions necessary to guard yourselves against it: these precautions must likewise be extended towards the soldiers whose health is committed to your care, without however their being acquainted with the motives for them. The most important of these precautions are, cleanliness, frequent washings with cold water and vinegar over the whole body, washing frequently likewise the linen and clothes, a great deal of exercise, and temperate diet. You must also forbid the wearing of the pelisses taken from the Turks, and above all, impress upon the soldiers the pernicious effects of making holes in the ground to sleep in.

"This disease ceases during the northerly winds, and reappears on the return of the south wind, or *khamsin.*

"You must all be aware, gentlemen, of the importance of stopping the progress of this reigning disease, which has already carried off many of our brave companions. I hope, therefore, that penetrated with the reflection of this truth, you will neglect nothing to support my endeavours, to the end that we may altogether accomplish the main object we have in view.

"I invite you all to combine your efforts, during the assaults that may take place, with those of the surgeons of the ambulance, to dress the wounded with one common accord, and with the same zeal as you have shewn in the siege of Jaffa."

As soon as the works of the trench were in sufficient forwardness, we began to batter in breach the great tower, and to bombard the town. The attack was terrible for the besieged, and if the breach had been practicable we

should have been soon masters of the town; but the grenadiers who first entered, not finding any opening on the side of the town, were assailed by a shower of balls and stones, and saw their companions no more. This want of success was but a presage of the future misfortunes attending this siege.

Some English troops effected a landing at Caiffa, from which they were vigorously repulsed, with the loss of fifty prisoners, ten of which were wounded. General Kleber, with his division, defended the passes of the mountains leading to Nazareth. The general of the advanced guard, Junot, in one of these defiles, checked the progress of the hostile army and drove them back, with only three hundred brave men. The shock was tremendous, but fortunate on our side. This action, in which we had twenty wounded and some killed, may be justly compared to that of Thermopylæ. General Kleber, who observed the movements of the enemy, soon became convinced, that the troops assembled in the plains of Eschelon, near Mount Tabor, were assuming an imposing attitude, and attempting to turn the mountains to come to the relief of the besieged.

In order to prevent this junction, Kleber descended from the mountains with his column, and proceeded to attack them in the midst of the plain. However, as he felt himself far inferior in numbers, he solicited the assistance of General Bonaparte, giving him information of the progress of this new enemy. The Commander-in-chief immediately repaired to the spot with a part of his troops. After two days forced march, we arrived about four in the evening on the ground where Kleber's division had been hard pressed on every side by the enemy ever since morning, and which was on the point of yielding to superior numbers. Bonaparte gave the signal for the charge, when the light troops and the cavalry rushed with impetuosity upon these numerous hordes, and obliged them to disperse and fly towards the mountains.

This battle however gave us above a hundred wounded

men, who were carried to Nazareth, where we had established an hospital in the convent of the holy land. The troops afterwards returned to St. Jean D'Acre. I shall have occasion hereafter to take notice of some extraordinary cases which this day furnished amongst our wounded men.

In the mean time the Commander-in-chief resolved on prosecuting the siege of St. Jean D'Acre with fresh vigour, and another assault was attempted, which likewise failed of success. The enemy pushed his advances as far as our first line, and every day sanguinary and obstinate engagements took place. We were obliged at length to change our measures, and to multiply our operations, which increased the number of wounded and the fatigue of the troops. The disease above mentioned continued to gain upon us; nevertheless, as it was a matter of moment to gain possession of the town, we repeated our assaults even to the thirteenth time. It will not be difficult to conceive, considering all these things, and the insalubrity of the situation, what we had to suffer. I could not enjoy a moment of calm and undisturbed repose. I was obliged to be passing constantly from the ambulance in the trenches to the hospitals, where we had as many wounded as in the trenches. Not less than two thousand men were the result of this siege. All the wounds were severe and serious. Some were wounded twice or three times, and from close combat. We were under the necessity of performing seventy amputations, two at the hip-joints, of which we shall speak hereafter. Of six amputations at the shoulder joint, four were perfectly cured. Out of seven on whom the operation of the trepan was performed, five were cured, of which two were trepanned on the frontal sinuses.

General Caffarelli, at the third assault, received a wound, which so completely shattered all the parts of the elbow-joint, as to require immediate amputation. The shock from the wound was considerable; but the stump continued to do well till the 13th day, when the General was attacked

by a nervous fever, which terminated his glorious career on the nineteenth day.

The chief of brigade, Sanson, escaped fortunately from tetanus, which threatened him, in consequence of a ball received in the thumb. The division of the wounded nerves dissipated the symptoms.

M. Duroc, first aid-de-camp to the Commander-in-chief, nearly perished from an enormous wound in the right thigh, from the bursting of a shell, which carried away a large portion of integuments about the bend of the thigh; many nervous branches were broken or torn, and the crural vessels were laid open. The removal of the shattered disorganized portions, and the division of such parts as were distended or strangulated, with soft dressings, and the most assiduous attention, the fatal symptoms which appeared inevitable were prevented, and the patient brought to a perfect cure.

M. Arrighi, aid-de-camp to General Berthier, received a ball, which cut the external carotid artery at its separation from the internal, and at its passage through the parotid. The fall of the patient, and the sudden *jet* of blood from these two openings, attracted the attention of some artillery-men. One of them, a very intelligent man, had the presence of mind to place his fingers instantly over the two openings, and thus stopped the hœmorrhage. I was immediately called to him, and hastened to his assistance, in the midst of balls and bullets. A bandage methodically applied, to my great astonishment by its pressure, arrested the rapid progress of death, and saved this officer. It is the only instance well attested of such a cure. How many more extraordinary wounds did this memorable siege present! However, in spite of the penury of our resources, particularly of medicines, in spite of the insalubrity of these plains, the wounds in general went through all their respective processes, even to cicatrization, without any extraordinary accident. During the progress of suppuration,

they were incommoded only by maggots, or the larvæ of the blue fly, which is very common in Syria.

The incubation of the eggs of this fly deposited in the wounds, or in the dressings, was equally favoured by the heat of the season, the moisture of the atmosphere, and the quality of the cloth used for dressing, it being cotton, the only thing we could procure.

The presence of these maggots in the wounds appears to hasten the completion of the suppuration; it caused also an inconvenient itching to the patient, and obliged us to dress the wounds three or four times in the day. These insects, formed in the course of a few hours, increased so rapidly, that in the course of a day they became as large as a chicken's quill. We employed at each dressing a lotion made of a strong decoction of rue and sage, which was sufficient to destroy them; but they were soon reproduced, as we had no means to prevent the approach of the flies.

All these wounded men were sent into Egypt, either during the siege, or at the departure of the army. Eight hundred went over the Deserts, and twelve hundred by sea from Jaffa; a very small number of which perished. It is to General Bonaparté that these honourable victims owe their preservation, and posterity will not behold without admiration among the heroic virtues of this great man, the act of feeling humanity which he exercised towards them.

The absolute want of the means of transporting them had reduced all the wounded to the cruel alternative of being either abandoned in the hospitals, or even in the Desert, exposed to die of thirst and hunger, or to be murdered by the Arabs. General Bonaparte ordered, that all the horses of the staff, not excepting his own, should be employed to transport the wounded. In consequence of which, each regiment was charged with the transporting its own sick and wounded, and every one of them had the good fortune to arrive safe.*

* Mr. Larrey has not been very happy in his choice of a subject to

Previous to our departure from Syria, a great number of the wounded men were attacked with the plague, at the moment their wounds were about to cicatrize, while at the same time it scarcely ever happened, that any of them were affected by it while the wounds were in a state of full suppuration; which circumstance has been likewise observed by other surgeons of this army who have written on the subject.

I have observed, likewise, that persons affected with herpes, or other cutaneous eruptions, which are habitual, have generally been exempt from the plague. Some experiments tried at Constantinople seem to prove that the cow-pox acts as a temporary preservative against this scourge.

As this disease has already been described at great length by the physicians of the army of the east, I shall only repeat here the report presented by me to the council of health at Cairo, bearing date the 28th of June. Experience has convinced me that the phenomena described in that report, constantly present themselves under the same appearances; and that the treatment there recommended has been always attended with the same success. I shall therefore lay them before the reader, with such slight additions as my observations have since furnished me with.

Memoir on the Plague which prevailed in the Army of the East during the Expedition to Syria.

The pestilential fever had already attacked some individuals at Qatyeh, or El A'rych, and at Gaza, on the passage of the army through these places; but it was not till

convey an idea of Bonaparte's humanity to posterity for their admiration. Would Bonaparte have easily induced his army to march away, leaving their wounded comrades to certain destruction, while there were any horses of any kind to bring them away? We have heard other stories of his humanity at Jaffa, Translator.

our arrival at Ramleh, that it declared itself in a decided manner. During the siege of Jaffa, several soldiers, apparently in good health, died suddenly of the plague; and after the surrender of that place, it began to develope itself with such a degree of intensity, that, during our stay there, the number of deaths was from six to twelve, and fifteen per day. The disease then disappeared for a time, but it was only to return with increased violence, and did not quit the army till the siege of St. Jean D'Acre, where it committed its greatest ravages. The following are the principal phenomena it presented, with different degrees of violence, in all the patients I have seen or treated.

The patient languishes some time in a state of great disquietude and general uneasiness, which prevents him remaining a moment in the same position. He becomes indifferent to every thing; the appetite for ordinary food disappears: in the first moments indeed he feels a desire to take some cordial liquors, such as wine or coffee: he feels a difficulty of breathing, and seeks in vain for pure air. To this anxiety succeeds a general debility; heavy pains in the head, principally in the frontal sinuses; pains in the great joints; all the cicatrices of wounds become painful: frequently he is affected with gripings; irregular cold shiverings are felt all over the body, but particularly in the lower extremities; the countenance becomes discoloured; the eyes are dull, without expression, and suffused with tears; the excretions are suspended; sickness at the stomach comes on with great desire to vomit; and even vomitings of a matter at first glary, afterwards bilious. In the first moments, the pulse is small and quick. Some hours after the invasion of these symptoms, a general heat is felt over the body, which seems to centre in the præcordia; the pulse rises and becomes accelerated; the surface of the skin is burning hot, and is covered with a clammy moisture; the pains of the head increase, and produce vertigoes; the eyes become haggard, the sight confused, the voice feeble. The patient becomes drowsy, and experiences at intervals

involuntary contractions of the muscles of the limbs and face. The fever is now at its height, delirium comes on sooner or later, and in some patients becomes furious. I have seen some before St. Jean D'Acre go out of the hospital or tent, run over the fields, rush into the sea up to the middle, and after the most violent exertions, return to their place; or sometimes fall down and faint in the first place they come at, and there instantly expire. The delirium often makes its appearance with the fever; and its duration is in proportion to the strength of the subject. Sometimes it finishes together with life in the course of a few hours; at other times it keeps up for twenty-four hours; two days; and very rarely it extends even to the fifth day, at least if it is but slight. This period may be called the inflammatory stage. Soon after all the excretions are restored, especially the stools, which degenerate into diarrhœa, or dysentery: the blood passed in this case is black and fetid.

Tumors in the axillæ and groins, and other parts of the body make their appearance, which are called buboes; they never attack however the substance of the glands, but are found almost always below them, or in the neighbourhood of them.

Whilst they appear in the beginning of the disease, and terminate by suppuration, they seem to produce a favourable crisis. At other times carbuncles are formed, which are generally seen in the face or extremities. Their number is various.

When the disease appears all on a sudden, and there are neither buboes nor carbuncles, lenticular spots are often seen, which are at first all red, afterwards they become brown or black, when they constitute petechiæ. They often extend themselves, run into one another, and form carbuncles. (This second period may be called the exanthematic stage.)

This disease presents a great many anomalies; sometimes it developes itself all of a sudden, produces the most alarm-

ing symptoms, and carries off the patient in a few hours. I have seen a serjeant-major of the 32d demi-brigade, a man of twenty-three years of age, of a robust constitution, perish after only six hours of illness. When the disease is thus violent, there do not appear any external symptoms; but at the instant of death, or a few moments after, the body becomes covered with gangrenous petechiæ.

In the greatest number, however, of those whom I have treated in the plague, it has taken a less alarming course. Pains of the head, weakness, nausea, and vomitings took place before the first twenty-four hours: the fever took place the second day; the buboes made their appearance about the same time; and if they were followed by inflammation or suppuration, the symptoms subsided by the fourth day, and insensibly disappeared: the buboes formed abscesses, and might be considered as cured. On the contrary, if the buboes did not suppurate, all the symptoms made a rapid progress, and the patients died by the third or fifth day.

Where the disease was of short duration, death was ushered in by the most horrible symptoms. I have seen several persons die in this manner. If the patient is on the march, he falls all at once, is seized with convulsions and violent contortions; all the features of the countenance are discomposed; the lips gape and are twisted into all kinds of shapes; the tongue swells and comes out of the mouth; a thick fetid kind of saliva flows involuntarily; the nostrils become dilated, and an abundance of sanious fetid mucus flows from them. The eyes are open; they seem ready to start from their sockets, and remain immoveable: the skin of the face becomes discoloured; the patient twists himself up, utters some doleful cries, and expires immediately.

Death presents a less terrific appearance when the disease has been prolonged, and the original constitution of the patient is weak. The plague has for the most part attacked young people and adults, and rarely those of an advanced age. Persons of a phlegmatic and fat habit have been most

exposed to it: those of a dry temperament have been in general more spared.

It appears that the pestilential virus acts principally on the cerebral and nervous system; and in proportion to its intensity, the organs of sense and motion will lose their functions. I have observed that the organs of digestion were the first, and the most severely affected; a foulness of the first passages quickly establishes itself, and by these means the disease becomes complicated. (This third period may be denominated the *nervous stage.*) Thus it is that to this first sedative cause, is joined a putridity, which co-operates to destroy the whole machine.

Many observations lead me to think that this pestilential virus can preserve itself in the system alive for a greater or less length of time, whilst the plague has not yet declared itself in a complete manner, or that the crises have been imperfect, especially whilst the buboes have not yet suppurated, or that the suppuration has been by some cause or other suppressed. It is likewise probable that this pestilential germ acts in the same manner as some other contagions, such as the small-pox, the measles, and the scarlet fever.

The epoch, the most favourable for the developement of this virus, is the season when the plague reigns in Egypt, that is to say, during the *khamsyn,* (south winds,) which blow for about fifty days, and which take place before and after the vernal equinox; whilst at the same time, in other seasons, the persons who are infected by it, appear to enjoy good health.

I have witnessed many soldiers, who having had the plague to a degree more or less strong, have experienced the following years during this season relapses which may be distinguished from the plague itself by symptoms, which are not only less violent, but present likewise some shades of difference. The plague, properly so called, can likewise occur several times in the same subject, as we have seen many examples, which proves the inutility of inoculation.

In these relapses the cicatrices of the buboes ulcerated and put on a gangrenous appearance in some patients. This local alteration was accompanied with loss of appetite, nausea, and sometimes a vomiting of bilious matter of a deep green colour, with heaviness of the head, vertigo, and general lassitude. In other instances, the buboes which had not suppurated, swelled at the same epoch, and formed purplish indolent tumors, which remained in a schirrous state, or sometimes they suppurated. In the latter case the fluctuation was preceded by gangrenous vesicles, which pointed out the necessity of opening the abscesses without delay. These local symptoms were likewise accompanied with lassitude, heaviness of the head, &c. I have also seen some in whom the cicatrices of carbuncles have put on a blackish appearance, produced painful twitches in the subjacent parts, and uneasy sensations in all the motions of the body.

Gentle emetics, and the use of cordial medicines for a few days, generally sufficed to put an end to these affections; but they generally returned at the epoch above mentioned, with the same phenomena. I have observed that in these cases of relapse there was no contagion; without doubt, because the disease degenerates and loses its true character, in proportion to the length of time elapsed since the plague, properly so called, has taken place, and the distance from the climates where it is endemic. The greatest part of the soldiers who were thus attacked, slept in the barracks with their comrades, without communicating to them the disease.

Amongst the great number of persons who were visited with these relapses, Mr. Leclerc, a surgeon of the second class, who had had the plague in Syria, furnished one of the most striking examples. He had experienced every year after this campaign, at the seasons when this malady prevails, slight returns of it. His buboes, which had terminated by resolution, swelled up prodigiously, especially that on the left side, which then hindered the movements of

the thigh, and kept the whole limb in a state of extenuation and debility. The first year, being at Gyzeh, near to Cairo, there appeared upon his face a leprous eruption, of a very malignant aspect, which resisted all the means I employed to remove it, and which disappeared entirely by an effort of nature at the season when the plague ceased. This officer happening to be at Paris at the same season another year, his buboes began immediately to swell; but there appeared no other symptoms. I advised him to apply the caustic potash, but he refused, and in spite of my advice would set off for Saint Domingo.

I was persuaded before-hand that in consequence of this pestilential affection, he would easily contract the endemic fever of that country, which appears to me to have some analogy with the plague. In fact, he was hardly arrived in the country, when he furnished one more victim to that murderous fever. I could produce other equally remarkable instances.

During the campaign of Syria, I was desirous of searching for the causes and effects of plague even in the bowels of the dead. The first body I opened was that of a volunteer of about twenty-five years of age, whose principal symptom was a carbuncle on the left arm. His body was sprinkled over with petechiæ, and emitted such a nauseating odour that I could with great difficulty support it. The abdomen was inflated; the omentum yellowish, and speckled with gangrenous spots; the intestines were bloated and of a brownish appearance; the stomach was sunk in, and gangrenous in several points; the liver more voluminous than ordinary; the gall bladder full of a black fetid bile; the lungs of a dull pale colour, intersected with dark lines: the heart was of a pale red, and its substance almost macerated, and easily to be separated; the auricles and ventricles full of a black liquid blood: the bronchia filled with a reddish frothy liquor. One of the surgeons assisting at the opening of this body caught the plague and died.

The second body examined was that of a serjeant-major

already mentioned. Nearly the same morbid appearances presented themselves both in the abdomen and the thorax. The liver was still more choaked up; the pericardium was filled with a bloody fluid, and the cellular tissue covered with a network of varicose vessels filled with black liquid blood. I have opened several other bodies of persons who have died of the plague, and have generally found the same appearances. I had never however the opportunity of opening the cranium.

This disease committed great havoc amongst the inhabitants of Gaza, Jaffa, and St. Jean D'Acre. It did not even spare the Arabs of the Desert near the sea. It was hardly perceived in the villages amongst the mountains of Naplouse and Cauaan, but it spread through all the low countries, and marshes, and along the sea coast.

Few of the inhabitants of these places who were attacked by the plague, escaped death. The kind of treatment employed by their practitioners of medicine, and the fatal prejudice which they have of believing it not to be contagious, are without doubt causes which co-operate in their destruction. I was never able to obtain any reports of the numbers who died of this disease among the inhabitants of these countries. I consider the plague to be endemic, not only along the coast of Syria, but even in the towns of Alexandria, Rosetta, Damietta, and all over lower Egypt.

In fact, it appears to me to depend upon causes which are peculiar to each of those countries. Any one would be convinced of the truth of my opinion, by considering the construction of their towns, the streets of which are narrow, crooked, and not paved: the houses have few openings in them, and most part of them filled with rubbish: added to which, every cross-way forms a deposit for excrement and every filthy matter, where the water from the rains stagnates during the winter. This particularly happens in the sea-port towns, but more especially at Damietta, on account of the situation of the ground in these towns, which is always below the level of the sea or of the neighbouring

lakes, or of the rice fields, which are always marshy and very productive of infection. By taking into consideration, that during the same season the south winds continue in these countries so long as the end of May, which renders the atmosphere always hot and moist. By reflecting also on the want of cleanliness of the inhabitants, their bad living, and of the state of inaction in which they constantly remain; to which we may add also the number of dead bodies of animals left in the public streets, especially of dogs, which before our arrival in the country was prodigious; and the vicinity of the burying grounds to the towns, which are formed of tombs of very bad masonry, in which the Turks always make a vent hole towards the east, which communicates with the dead body, so that whilst it is decomposing, the gases escape by this opening, and contribute to the infection of the atmosphere.

So likewise at Alexandria, where the plague raged with great violence during the first year, as the storming of the place gave rise to a great number of dead bodies both of men and animals, which were either left upon the ground, or very badly buried under the ramparts; the bodies consequently began to putrify, and contributed to the formation of this disease.

It was nearly the same at El A'rych, where we lost seventy men of the plague out of five hundred, who constituted the garrison, where a great number of animals, already in a state of putrefaction, (the consequence of the siege) were buried near the fort with too little precaution. The same occurred at Gaza, where the Mamelukes left in many parts of the town, a great number of carcases of horses, who had fallen victims to an epidemic disease amongst the cattle which preceded the plague; which, according to the reports of the inhabitants, made a great havoc amongst the Mamelukes.

With respect to Jaffa, it is sufficient to observe, that it was taken by storm, to convey an idea of the confusion which prevailed there; and of the sources of disease resulting

from an infinity of causes of infection. These, together with the contaminated objects left in the town by the Turks, produced a pestilential blast, which proved very fatal to the troops of the garrison and to the inhabitants. Although this place is generally visited every year by the plague, the inhabitants affirmed, that they never remembered for more than thirty years, the disease to produce such serious effects.

I have before observed that the plague during the continuance of the south winds, put on a more formidable appearance than during the winds of north or north-east, which always diminished its effects, and even caused it to disappear, if these winds continued for any length of time. It likewise appeared again with as much violence as ever on the return of the south winds, (or *khamsyn.)*

When this disease is ushered in by fever and delirium, it is seldom that the patient recovers. In spite of the means employed, he generally dies after four and twenty hours, or at most on the third day. Nevertheless, I saw an instance of an officer, who had seven carbuncles, and in spite of the violent delirium with which the disease was ushered in, and which continued three days, suppuration was notwithstanding established; the eschars fell off, the symptoms subsided, and the cure was perfectly completed, after a very long and tedious convalescence. The wife of this patient, who was six months advanced in pregnancy, likewise contracted the plague, which was however less severe, and which was likewise cured without her suffering any abortion. But two other pregnant women, whom I likewise had charge of, miscarried in the first twenty-four hours, and died immediately.

If the fever however does not occur until the second day from the attack of the disease, there is less danger, and time is given to prevent the consequent symptoms. I have observed, as I have elsewhere said, that the plague rarely attacks the wounded, whose wounds are in a state of plentiful suppuration; whilst at the same time, as soon as they were

skinned over, a great many were attacked, and very few escaped death. We have observed the same thing amongst the inhabitants of the country, who had issues. Galen, Fabricius de Hilden, and many celebrated authors, have observed, that in countries which they have seen ravaged by the plague, it had spared all those who had issues plentifully discharging.

I have likewise noticed that affections of the mind aggravated this disease, and facilitated the developement of it in those who already were in possession of the seeds, by inducing it from the slightest causes. But however strong these affections may have been found, their effects will admit of no comparison with those resulting from the communication of a sound with an affected person, or the effects of contaminated objects. This truth may be demonstrated by the ravages made by the plague in 1801, amongst the predestinarian Mussulmans.

I would not have it supposed either that the name of the plague has terrified our soldiers. They had been too much accustomed to receive impressions of every kind without emotion. Their moral and physical sensibility was, if I may use the term, blunted by the different shocks they had received in the laborious campaigns they had already gone through. It would even have been desirable that, from the first invasion of the disease, it had been laid before the view of the troops, (in the least unfavourable manner) in its true character: the number of victims would by these means have been diminished; instead of which, the soldiers impressed with the idea, which was at first circulated among them, that the disease was not plague, never hesitated, in cases of necessity, to appropriate to themselves the clothes of their companions who had died of it. The seeds of pestilence did not long delay to produce their effects in these persons, who afterwards shared the same fate. It was not till after they were perfectly acquainted with this disease, that many of them preserved themselves from it, by taking the precautions pointed out to them.

In the first period, out of ten patients attacked with the plague, there generally died five, six, seven and eight, but afterwards more than two-thirds recovered. These successes are principally owing to the zeal and courage of the Physician-general, Dr. Desgenettes, who himself conducted the treatment of these patients, which were placed in the fever hospitals.

The indication of cure bears a proportion to the degree of intensity of the disease. If the patient is in the first stage, that is to say, before the developement of the symptoms which may be called inflammatory, great advantages may be obtained, by evacuating the *primæ viæ* by emetics more or less strong. The tartarized antimony has the two-fold property of impressing upon the whole system a salutary succussion, and of putting an end to the spasm of the capillary vessels, and opening the passages of the perspiration, which may be kept up by diaphoretic drinks and antispasmodics. These means sometimes prove sufficient to avert the impending disease; but in all cases they favour the exanthema.

When the inflammatory stage has commenced, the use of the tartarized antimony may be continued in very small doses, given in tamarind drink with nitre, or in lemonade. If any signs of local turgescence appear in any part of the body, cupping glasses, either dry or with scarifications, should be applied; but general bleeding is never indicated, however violent the symptoms of general turgescence may appear to be. The use of acidulated drinks should be insisted upon, of theriacal antispasmodic draughts, of pediluvia, frequent washings of the whole body, with equal parts of cold water and vinegar, or of the juice of lemons, which abound in all warm countries: the patient likewise should take some pills of nitre and camphor in the evening, beside some æther draughts. Emetics would be dangerous at this period of the disease, but they may be administered after the cessation of the inflammatory symptoms, if their use should be indicated. The opportunity for administering

this remedy, if not employed on the first invasion of the complaint, will be difficult to hit on.

It is at the end of this second stage, which terminates commonly about the fifth, sixth, or seventh day, that the exanthemata begin to appear, such as the buboes or carbuncles. Their developement ought to be assisted by stimulants and rubefacients. On the first signs announcing a relaxation of the disease to be taking place by a cessation of the pains, of the heat of skin, &c. and by the restoration of the cutaneous excretion, urine, &c. instead of the acidulated diaphoretic drinks, should be instantly given bitter tonic infusions, such as camomile, arnica, angelica, sage, &c. or weak coffee, to which is added lemon juice and sugar. This drink, which is very agreeable, we have employed with great advantage.

This third period, properly called the *nervous stage*, being principally remarkable for the great prostration of strength which accompanies it, it becomes especially necessary to increase the quantity of tonics. With this view the cinchona may be added to the bitters above mentioned; the decoctions of coffee and the acidulated drinks may be persisted in, and the doses of camphor should be increased. Instead of washings with vinegar and water, it will be necessary to employ pure vinegar or camphorated spirit of wine. The spirit of dates has likewise been of great service to us employed in this manner.

Frictions with oil, extolled by some writers, were employed without any perceptible effect. They may nevertheless be employed as preservatives.

When the buboes have run through all the degrees of inflammation, and suppuration ought to be taking place, nature should be assisted in effecting this termination, which is the most desirable one. Cataplasms of squills roasted under the ashes, should be applied very hot from the beginning. They accelerate the inflammation, and facilitate the formation of pus: I employed them with great advantage in Syria, a country abounding with bulbous plants.

It is not proper to wait for their complete suppuration to open them, which operation will be best performed with the bistoury. If however the bubo is indolent, and no change of colour takes place in the skin, it will be necessary to have instant recourse to a small actual cautery, and immediately after to apply a cataplasm. This method often provokes inflammation, which is followed by suppuration, and the consequent cure of the patient. The potential cautery operates more slowly, and does not possess the same advantages. The dressings should be simple, but tonic and suppurative.

The treatment of carbuncles consists in exciting in the subjacent parts a slight degree of inflammation, which causes the detachment of the eschars. Hot and stimulating poultices are of use in this instance, and scarifications and excisions of the gangrenous parts, into which some fluid caustic should be dropped.

It cannot be disputed that the plague is epidemic and contagious. The rapid progress it has been known to make, and a most unfortunate train of experiments amongst the Turks, put the effects of its contagion beyond all doubt. But this does not appear to take place in every period of the disease; and it is propagated in different ways. I do not think, for instance, that the plague communicates itself from one person to another whilst the affection is slight, and in the first stage. I do not think either that there is any fear of catching it from touching the patient's pulse with the finger end; from cauterizing or opening the buboes or carbuncles, or applying hastily topical applications, or from touching a small surface of the body, or clothes, of whatever kind they be, or from going into the sick-room, provided there be a current of air. The convalescents from this disease, or those affected simply with a relapse, do not communicate it.

A long stay however in pestilential apartments that are but little aired should be carefully avoided, as well as the exhalations from the dead bodies, or from patients in the

third or fourth stage of the disease: touching large surfaces of the patients bodies should be abstained from, and likewise putting on any of the clothes that have been made use of by persons affected.

I am of opinion that the matter of carbuncles and of buboes communicate the disease when it comes in contact with the more sensible and interior parts of the body, at the time when these carbuncles are making any progress: thus, M. Charroy, an officer, in 1801, was attacked with the plague attended with a bubo in the right groin; having neglected to have it opened, there was formed, before the bubo suppurated, as it were by metastasis, a narrow inflammatory line which descended along the interior of the thigh, in the course of the crural nerves down to the knee, where a carbuncle made its appearance. From this proceeded two othar similar lines, which, separating as they descended, terminated, one upon the inner ancle, the other upon the course of the tendo achillis, where they produced two other carbuncles of the same nature. The means prescribed above were employed in his cure, which was effected after an illness of three months. But what was most remarkable in this case is, that during the paroxyms of the disease, which lasted about six weeks, all the right half of the body was paralyzed; so that this patient was deprived, during all this time, of the sight of the right eye, of the hearing of the same ear, of a part of the sense of smelling and of taste, of the motion of the whole side, and the leg and thigh became almost in a state of atrophy. All these symptoms however ceased together with the disease at the end of the season in which it commonly rages. The patient soon recovered the use of all his faculties, and returned to France, where he continued to enjoy to all appearance good health, until the return of the season which answers to that of the plague in Egypt. This officer was ordered to the mineral springs of Bourbon and Bavege, but nevertheless the disease made its appearance several times at the epoch above stated.

All these phenomena prove, in a manner incontestable, that the pestilential virus acts principally upon the cerebral system, and the nerves of animal life.

Just before our departure from Alexandria for France, General Menou was attacked with all the symptoms of the plague, which developed themselves in a very slow and gradual manner. He was affected with three small carbuncles, which appeared on the upper part of the left leg. The General was not at all alarmed at this symptom, having once before been affected with one on the left arm. Nevertheless, the degree of anxiety and lowness of spirits which existed, the inequality of pulse, head-ache, and other alarming symptoms, made me apprehend dangerous consequences. The south-winds had begun to set in, and the whole army was either gone or on the point of sailing; we were consequently reduced to the alternative of allowing the disease to increase with rapid progress, in the midst of a town infected from a thousand different sources; in the midst of enemies, without resources; or else of transporting with us in the vessel the germ of the plague.

However I conceived the last alternative to be the least dangerous, and the wisest; so I caused the apartment of the General on board the frigate to be isolated, and isolated myself with him to render him the necessary care, without having any communication with the rest of the ship's company, in the supposition that the evil might become worse on board. But I had every reason to hope that quitting the soil of Egypt, and changing our atmosphere, together with the motion of the waves, would give a favourable turn to the disease. Beside, we should reach France at a season when the plague could not develope itself, as the weather would probably be sharp and dry at the time we should arrive. I had beside formed the idea of putting into one of the Grecian ports, if the disease should put on a dangerous appearance. I accordingly stated to the General all the dangers of his situation, and shewed him the consequences of delay. He followed my advice, and embarked

the same night. We sailed in the morning at day-break. During the night the carbuncles had extended, and the next day all the other symptoms were greatly aggravated.

From the first carbuncles there appeared inflammatory lines, of an erysipelatous character, which spread over the whole interior surface of the leg, extending themselves with a very winding course towards the ancles. These were interspersed with other carbuncles at small distances from each other, of a similar appearance to the first.

I was about to administer to the General a few grains of tartarized antimony, when all at once the wind, which had been before at south, came round suddenly to the north-west, and blew very strong. The General was immediately attacked with sea-sickness. He had copious vomitings of bilious matter, and violent alvine evacuations, which were followed by profuse sweats. These violent shocks at one time made me fear for his life; however after the squall ceased, the patient became more composed, the head-ache disappeared, sleep succeeded, and he was soon in a situation to take some cordial medicine. The gangrenous sloughs of the carbuncles became circumscribed, and a red circle which surrounded them announced to me that suppuration was at hand, and the vital strength about to be restored. I applied the storax ointment to the carbuncles sprinkled with powdered bark and camphor, and compresses wetted with camphorated and ammoniated red wine. I employed internally bitters, with camphor, opium, and Hoffman's anodyne æther, which was varied according to circumstances, with bark in suitable doses. This method was persisted in till cicatrization took place, which was nearly completed when we arrived in France.

The General was quite recovered when we entered into quarantine at Toulon, where all the effects belonging to the ship's company and to every individual on board were fumigated and exposed to the weather. The first cold weather which he experienced at Marseilles brought on a dysentery,

so obstinate as to detain him all the winter at Marseilles, and he was only able to set out for Paris in the spring.

From all these facts, I think we may fairly conclude, that the inoculation for the plague is both useless and even dangerous. Dr. James M'Gregor, superintending physician of the English army in Egypt, informs us in his narrative of the expedition of the army of Seppoys, that Dr. White, physician to the same army, in his presence, during his stay at Rosetta, inoculated himself with the matter of a pestilential buboe, and died of the plague the ninth day from the inoculation. A carbuncle formed on the very point of the groin where he had made his puncture.

The dangers which Dr. Wallis encountered at Constantinople are well known, having inoculated himself superficially for the plague, after having introduced with a temporary success the vaccine virus. This eruption no doubt acts as any other emunctory which has been some time established; for, at the moment of the invasion of the disease from which we wish to be preserved, the emunctory would not hinder its developement.*

In order to guarantee one's self from the plague, we must take a great number of precautions; the most efficacious are, great exercise, cleanliness, and good living. It is necessary to keep up with great care every kind of discharge or eruption that may happen to exist in the body; and it will even be useful for any one who cannot keep himself isolated from the contagion, to open an issue or perpetual blister. All the celebrated physicians of antiquity have recommended, and extolled the efficacy of this last method; and in 1783, the Royal Society of Medicine at Paris, after

* The obscurity of this passage seems to require some explanation. M. Larrey supposes the cow-pox to act as a preservative from the plague only as any other suppurating ulcer, or as an issue which has been some time established. But if this suppuration is only established at the moment of the invasion of the disease, it will not prevent its developement. So likewise when the suppuration has ceased, it is no longer a preservative.

an excellent memoir of Dr. Carrere, pronounced the establishment of artificial discharges to be the best preservative from the plague. To these means we may add, abstinence from spirituous liquors to a certain degree, and from seasoned dishes, and from milk. Drinking plenty of coffee, and a little sage tea every morning fasting; frequent washings of the body with vinegar and water; abstaining from bathing during the morbific season; frequent change of linen and clothes; sleeping in apartments dry and well aired; and avoiding all violent affections of the mind. On the slightest appearance of foul stomach, a gentle vomit should be taken.

In the mean time I am of opinion, that in Egypt this disease might be greatly diminished, and the causes of it be made insensibly to disappear, by preventing the stagnation of the waters of the Nile, during the time of their subsiding into the basons prepared for them near the houses, by digging channels for irrigation properly directed; by forming plantations in all the moist and marshy places; by establishing the rice fields at a greater distance from the habitations; by removing the burying grounds to a distance in the deserts, and having them always on the west side of the towns and villages; by rasing to the ground all the tombs left in the cities, and covering them with quick lime; by raising the ground on which the buildings stand, so as to prevent the possibility of inundation; by covering the streets with sand or gravel, and constructing tanks in the sea-port towns where the rain is most frequent; by altering the construction of the houses of the poorer class, and impressing the inhabitants with a sense of the possibility of securing themselves from the contagion, or of curing the disease, after the example of Europeans, who preserve themselves from it by the precautions they employ, and who frequently cure it by medicine, when attacked. In short, one of the principal means of preventing the invasion and propagation of the plague in Egypt would be, to convince the Egyptians of the value of the good and wise

regulations, which the Extraordinary Committee of Public Health had decreed and carried into execution with a degree of success which exceeded all expectation. This Committee was established by Bonaparte. Three other Committees, subordinate to this at Cairo, were established at Alexandria, Rosetta, and Damietta.

The march of the army to Egypt was rendered still more necessary, by the news we had heard of the near approach of innumerable troops from the eastern countries. This march was still more painful than the preceding one. The soldiers weakened by disease, by fatigues and privations, were under the necessity of leading or carrying by turns their wounded comrades. The heat had already set in very intense, and increased progressively as we approached Egypt. We followed the sea-coast, and passed through Cæsarea.

Our arrival at Jaffa presented a mournful spectacle. The town was in ruins, and abandoned by a great part of its inhabitants. All our sick and wounded who had marched along the coast crowded into its hospitals, its harbour, and all the neighbouring streets; and presented a most distressing picture. We took up three days and three nights in dressing them. I afterwards sent the worst cases on board ship to proceed to Damietta by sea, and the others were ordered to accompany the troops through the Deserts to Egypt. It is hardly possible to conceive the fatigues which the French surgeons had to undergo in this conjuncture.

After this arrangement we proceeded on our march through the Desert, without halting at Gaza. In passing by El A'rych, we left them all the convalescents from the plague who had accompanied us, and all who where taken ill on the way. This march was extremely laborious, but it

became still more so, when on arriving at the sandy plain which extends from the Roman bridge to Sâlehyeh we were surprised by the pestilential wind. It was here for the first time that we experienced the terrible effects of the khamsyn, (the burning wind of the Desert,) of which Volney has given a most exact and faithful account.* All the effects which he describes I experienced to such a degree as had nearly proved fatal. For a few minutes after I fell into syncope, and had given up all hope of arriving at Sâlehyeh. Many of the beasts were suffocated, especially the horses: in short, the whole army was greatly incommoded by it. This day proved the last for many of the convalescents from the plague who followed us.

At length the sight of the fertile plains of Sâlehyeh, shaded by immense forests of palm-trees, the water of the Nile, the good provisions we found here, and the pure air we breathed, restored us to health and strength. The march afterwards through the province of Charqyeh, then presenting the beautiful and magnificent prospect of a rich harvest, appeared only a pleasant walk.

The sick and wounded who accompanied us, we left in the hospitals of El A'rych, Qatyeh, Sâlehyeh, and Belbeys, where they remained until perfectly cured. A great number embarked upon the lake Menzaleh, in order to go to Damietta, to join those sent from Syria, and they were all in the end sent to Cairo, where their cures were perfected.

Before arriving at Sâlehyeh, we had fallen in with, at certain distances, some wells or basins of a sweet muddy water, such as we have since found in the deserts of Lybia, filled with little insects, amongst which there exists a species of leech, which appears very similar to that found in the island of Ceylon. Although it is not naturally any thicker than a horse-hair, it is capable of acquiring the size of an ordinary leech gorged with blood. It is of a blackish colour, and presents nothing peculiar in its shape.

* Vide Volney's Travels in Syria and Egypt.

Our soldiers, pressed by thirst, threw themselves down on the borders of these basins, and without dreaming of the new enemy that awaited them, drank with avidity. Many of them were not long before they felt the puncture of the leeches which they had swallowed. The first effects of these bitings were a painful tickling in the fauces, a frequent cough, followed by a spitting of glairy matter slightly tinged with blood, and a disposition to vomit. To this irritation which the leeches induce in the sensible membrane of the throat, succeeded in a short time a tumefaction of the parts and frequent hæmorrhages. From this time the swallowing became difficult, respiration laborious, and the succussion occasioned by the cough, of the lungs and diaphragm, produced the most exquisite pains over all the breast. The irritation produced by the tail of the animal coming in contact with the epiglottis, or the edges of the glottis, kept up a continual coughing, which increased to a most painful degree. (The blood even gliding over this aperture might produce the same effect.) The patients at this period became evidently emaciated; their sleep and appetite forsook them; they became agitated and uneasy; and unless timely assistance was rendered them these symptoms would prove fatal, as has been sometimes witnessed.

The Egyptians are very well acquainted with this accident, as it occurs to horses, who receive these animals through the nostrils while drinking: they are informed of their presence by the uneasiness of the animal, and by the hæmorrhages which take place from the nose in the course of four and twenty hours after. The farriers of the country extract them with great dexterity by means of pincers fabricated for the purpose; and when they are out of the reach of this instrument, they inject salt water into the horse's nostrils; but they had never known an instance of such a thing occurring to a man. The first person to whom this accident occurred was a soldier of the 69th, who, on arriving at Sâlehyeh, on our return from Syria, was attacked with pricking pains of the throat, cough, and

spitting of blood. The quantity of blood he had lost had considerably reduced him. I questioned the patient particularly, and endeavoured by every means to find out the cause of these symptoms. On pressing down the tongue with a spoon, I discovered the leech in the throat; it was as large as the little finger. I introduced immediately a pair of dressing forceps in order to seize it; but at the first touch, it retracted itself behind the velum palati. I was then obliged to wait for its re-appearance, when, with a pair of curved polypus forceps, I caught hold of it at the first attempt. The extraction of the animal was followed by a slight hæmorrhage, which continued only a few minutes, and in two or three days afterwards the patient was perfectly restored.

During the march of the army from Syria to Belbeys, above a score of soldiers were admitted into the hospital in consequence of this accident; in almost all these the leeches were situated near the apertures of the nostrils behind the velum palati. In some instances, however, they penetrated into the œsophagus, and from thence fell down into the stomach, where they remained for a greater or less time, until they were forced to leave go, either from the effects of a little vinegar diluted with water, and a small proportion of nitre, or by the action of the stomach itself. During this time they caused a great deal of uneasiness to the patient. Gargles of vinegar and salt-water were found sufficient to detach them when they had fastened any where about the fauces. Sometimes, however, we were under the necessity of employing the polypus forceps, or fumigations of tobacco and squills: at other times injections of salt-water. Two of these patients not having been admitted to the hospital till some days after they had swallowed the leeches, were found to be greatly weakened, and not free from danger.

M. Latour Mauborg, commanding a regiment of chasseurs, set out from Alexandria during the blockade of that place to proceed to Cairo, and passed through the Desert

bordering on Lybia. Not being able to carry with him a sufficient quantity of pure water, he was obliged to drink on the march some dirty water found in some ponds in the Desert. The soldiers of his escort having some pure water in their canteens, did not drink of these ponds, by which means they avoided the accident which befel M. Latour. Two leeches which he had swallowed tormented him all the rest of the march, and reduced him to the greatest degree of exhaustion and emaciation. The cough and spitting of blood continued even some days after his arrival in Cairo, for the cause was not yet discovered. The medicines employed only aggravated the symptoms, and brought the patient's life into extreme danger; till at length the tail of a leech gorged with blood was discovered in the back part of the mouth. It was seized with a pair of forceps and extracted. The second one, which had fixed itself in the nasal canal, was soon after detached by means of injections of salt water through the nostril. His convalescence was however long and painful, on account of the considerable loss of blood he had sustained, and the fatigues he had undergone.

Pierre Blanquet, a soldier, having swallowed one of these animals, it passed from the throat into the nasal canal, where it continued to increase imperceptibly. The patient paid at first no attention to the slight symptoms which manifested themselves. At length came on hœmorrhages from the nose, troublesome prickings in the nostrils, severe pains about the frontal sinuses, vertigoes, and sometimes slight delirium. All his functions were deranged, and he became greatly emaciated. After languishing in this state about a month, he was sent to the hospital of Alexandria. The obstruction he felt in the nose, the difficulty of breathing through the nostrils, and the frequent hœmorrhages which occurred, made me suspect some extraneous body to be lodged in the nasal canal. In short, my first examination discovered the extremity of a leech in the left nostril. I first took it for a polypus; but touching it with

a probe, its sudden retraction discovered its true nature. I waited until it again developed itself; and then seized it with a pair of polypus forceps. From the moment of its extraction, the symptoms disappeared, and the patient soon after returned to his duty.

From the correspondence of the medical officers at Alexandria, it appears that the plague was arrived at some height before any means were taken to prevent contagion, as the medical men there could not be persuaded that the disease was plague until it had gained great footing. A great number of the surgeons here fell victims to it. The appearances of the disease were precisely the same as those reported above.

SECTION IV.

SHORTLY after our return to Egypt, the Commander-in-chief received information of an army of twenty thousand Ottomans having made good their landing on the peninsula of Aboukir. He accordingly marched immediately towards Alexandria; and every preparation was made by our department for giving the necessary assistance to the wounded, which the meeting of the two armies must inevitably occasion.

On the 25th of July, 1799, at day-break, our army found itself in sight of the enemy, and in a short time afterwards a vigorous attack on our part ensued. The shock was tremendous, and the victory for a long time doubtful. It was at length however decided in our favour. The enemy was completely routed with horrible slaughter. A part of them took refuge in the fort, drew up the drawbridge, and defended themselves for six days. Reduced at length by the bombardment, and exhausted by hunger and thirst, they surrendered at discretion the seventh day.

Numbers of them threw themselves into the cisterns by the way-side on coming out of the fort, and many lost their lives from the effects of thirst, and the quantity of water which they swallowed.

The French army had eight hundred wounded in this action, besides the Generals Lanne, Murat, Fuguiere, and other officers of distinction. Above forty amputations took place upon the spot, and with astonishing success. Several remarkable cases occurred which I shall notice hereafter.

General Bonaparte having given a fête to all the generals and commanding officers of corps, in celebration of the battle of Aboukir, announced to them his intention of going to inspect the sea-coast from the lake Burlos to Alexandria. On the 22d of August however the same year he embarked for France, leaving the command of the army to General Kleber.

We had hoped after the decisive affair of Aboukir to enjoy a little repose; but learned soon after that the Grand Vizier was marching a very considerable force upon the frontiers of Egypt. Our garrison of El A'rych, hemmed in on all sides, was forced to surrender. They proposed a capitulation, which the enemy accepted, but instantly violated. The greatest part of our troops were murdered; they did not even respect the medical officer, whose head the barbarians cut off at the moment he was dressing a wounded man.

On hearing this news, the General commenced his march on the 8th of January for Sâlehyeh, with all his disposable force. In the mean time a negociation for a peace was set on foot. A convention was at length concluded at El A'rych, and we prepared ourselves in consequence to evacuate Egypt. At the moment the citadel of Cairo and other fortresses were about to be put into the hands of the enemy, the General received a letter from the English admiral, Lord Keith, in which he declared, that by virtue of the orders he had received from his government, he could only allow the French army to pass home as prisoners

of war. This message excited the greatest indignation. Orders were instantly given to re-occupy the forts of Cairo, and to put every thing in a posture of defence. The intention of the enemy was very visible, and every preparation was made on our part for a vigorous attack as soon as the convention should be violated. The inhabitants of Cairo likewise threatened revolt.

On the 20th of November, at night, the army commenced its march from Cairo, and came in sight of the enemy at Heliopolis. After some military manœuvres on our part, and a discharge of artillery, the troops of the Grand Vizier took to flight. The Mamelukes and a party of cavalry moved towards Cairo, which they entered without resistance. The body of troops, with whom was the Grand Vizier himself, and his principal generals, were vigorously attacked in their intrenchments. A sharp contest, but of short duration, ensued, which was called the battle of Heliopolis, because it was fought on the ruins of that city. The rest of the enemy took to flight with their commander-in-chief, and did not halt till they reached Syria. This battle furnished fifty wounded. The cases will be taken notice of hereafter. Several other severe skirmishes took place, till at length this vast army, which a short time before almost filled the whole plain Matharieh, were driven into the Deserts, where we were informed a great part of them died from hunger and thirst, not being able, in departing from Sâlehyeh, to provide themselves with necessaries and water.

On our return to Cairo, how great was our surprise to find it defended by fifty thousand Turks, aided by the inhabitants. Boulak had likewise revolted, and was put in a state of defence. After several attacks, this place, which is a sort of suburb to Cairo on the banks of the Nile, was carried by assault. About twenty wounded men were the result of this action. After this affair, Cairo was attempted to be carried by assault, but without success; we lost a great number of men, and had above two hundred

wounded. The place continued to be closely besieged and bombarded, till at length a negociation was entered into, and a capitulation signed on the 20th of April.

During this siege, where we had to suffer a great number of privations, I had occasion to observe for the first time a species of yellow fever, which I shall describe in the following memoir:—

Yellow Fever considered as complicated with Gun-Shot Wounds.

The many fatal accidents which occurred at the battle of Heliopolis, and at the siege of Cairo, to a great part of our wounded men, induced a suspicion in the soldiers that the balls of the enemy were poisoned. It was easy to undeceive them, but not so easy to prevent the effects of the malady. It presented all the appearances of the yellow fever observed in America during the last war, and which according to the report of my former colleague, M. Gilbert, physician in chief to the army of St. Domingo, was renewed amongst the French troops in the last expedition to that country. In Egypt it attacked hardly any but the wounded, and particularly those who had been injured in the joints, or had fractured bones, or received wounds of the nerves, of the head, of the belly, or breast. Simple wounds of the face or extremities were seldom followed by any sinister accident. The disease first shewed itself about the 5th of April, 1800, and finished about the end of May following. I shall describe succinctly the principal symptoms as they presented themselves.

The wounded men had scarcely received the first assistance given them, when they fell into a state of depression of mind and anxiety; slight shiverings were felt over the whole body, and principally in the inferior extremities. On the first attack the eyes appeared sorrowful, the conjunctiva yellowish, the countenance copper-coloured, the

pulse low and oppressed. The patient complained of pain in the right hypochondrium, and the wounds either remained quite dry, or discharged a reddish kind of serum. To these symptoms succeeded a lively and general heat, a violent thirst, severe pains of the bowels and head, in some cases accompanied with delirium, frenzy, oppressed breathing, and frequent sighs. A hæmorrhage from the nose sometimes gave relief to these last symptoms, and favoured the bilious vomitings which took place with great difficulty before this evacuation. Sometimes too the hæmorrhages from the nose, followed by copious vomitings and stools, produced a salutary crisis in the disease. But much oftener the fever which established itself at this period, became more and more intense, and accompanied with evening exacerbations. The thirst increased; the tongue became dry, and as it were scorched; the eyes were red; the urine scanty, and of an inflammatory appearance; sometimes it was entirely suppressed, or retained in the bladder. The skin put on a yellow colour; the pains of the hypochondrium became more severe; the belly was painful and swelled. At length, the patient uttered continual plaintive cries, was totally deprived of sleep, and in a constant state of agitation, without the possibility of enjoying a moment of calm or repose.

If the symptoms proceeded in the manner here described, the disease had commonly a fatal issue. From the second day, and sometimes from the first, the wound was attacked with grangrene. All the fatal symptoms made their appearance in the first twelve hours which succeeded to the accident, and the patients died on the first, second, or third day. It was the sudden invasion of the mortification, and its alarming progress, which caused some persons to think, and especially the soldiers, that the balls were poisoned.

The opening of the dead bodies discovered to us the effects of the disease. A reddish coloured serum in the cavities of the thorax and abdomen, flatulence and phlo-

gans of the intestines, fulness of the liver and spleen. The gall bladder contained only a very small quantity of thick bile of a black colour. Gangrenous affections existed in different parts of the body, especially in the adipose substances. The organs of the thorax presented nothing remarkable. All the soft parts of the wounded limb were found in a state of gangrene, and diffused a fetid nauseous smell. Two hundred and sixty wounded of all sorts perished of this complication of disease, out of about six hundred that the siege of Cairo furnished, together with the taking of Boulak.

This yellow fever did not appear in all the wounded men with the same degree of intensity. The symptoms I have been describing in some patients took a more gentle and varied course. The irritation, vigilance, and nervous tension gave way to a state of general atony and drowsiness; and the constipation and pains of the hypochondrium to plentiful bilious or bloody evacuations by stool. The type of the fever was less violent, and the yellowness by so much the deeper. The disease was extended to the fifteenth day, and if it passed that period, our wounded men generally recovered. In that case there always happened, either by the urine, stools, or perspiration, a kind of crisis which changed the state of the patient for the better. All the symptoms speedily decreased; a good suppuration established itself in the wounds, and they went on without any obstacle to their cure.

The speedy manner in which the disease declared itself in those patients, who, with very slight wounds, happened to be placed in the beds of such as had died, persuades me that the disease was contagious; and the contagion took effect so much the more easily as the disease was more advanced, and gangrene established in the wounds. I have observed some men, affected with very simple wounds, contract the disease on being placed in beds where only the sheets could be changed, and near to other wounded men who

were attacked to the third degree with it. The disease all at once put on a serious character, and put the lives of these first wounded men in the greatest danger.

I am however of opinion, that this contagion has not so extensive a sphere as that of the plague, and of contagious typhus. What proves it, is that the disease never ascended to the first and second floors of the hospital where the fever patients were. In short, Dr. Savaresy, charged with the care of these patients, takes no notice, in his excellent treatise on the yellow fever of the Antilles, of having observed it in this hospital. Nevertheless, he has assisted at the opening of one of the bodies of our wounded men who had died of the yellow fever, or at least of the fever we have been describing, which may be found with different shades more or less varied in the *typhus icterodes* of the French and English nosologists, or the *vomito prieto* of the Spaniards.

I begged of M. Desgenettes, my colleague, to take a look at this fever which formed such a serious complication with the wounds; but he was himself confined to his room at Gizeh, and it was impossible for him to comply with my invitation. I have therefore to regret not having been able to profit by his advice in the treatment of this disease. There remain to me however the testimonies of the surgeons, my brethren, to vouch for the facts I have collected, with regard to its character, its course, its contagion, and its consequences. If any one should question the existence of the yellow fever in Egypt and Syria, where the plague is endemic, and where the climate is little favourable to the developement of the former disease, I should reply, that there are circumstances which depend on the varied constitution of the atmosphere, and the vicissitudes which soldiers experience during the occurrences of warfare, which might bring on such a sporadic disease, and for a time take place of the endemic diseases of the country.*

* Any one conversant with the yellow fever in the West Indies, will perceive at once that the disease in question has no kind of affinity with

The English, who succeeded us in Syria, appear to have encountered likewise the yellow fever; but in order to put the reader in a situation to judge for himself, I will report verbatim what I found in the Medical Journal of Dr. Witman, physician to the English military mission. The translation is faithful, and has been given me by a person worthy of confidence.

According to this English physician: "In the course of the autumn of 1800, whilst the military mission remained on the coast of Jaffa, where it was encamped with the Grand Vizier's army, there appeared a bilious remittent fever, accompanied with malignity. It began about the middle of August, and continued during the months of September and October. The weather was foggy and very hot; Fahrenheit's thermometer in the shade stood from 90 to 95 degrees. The nights were cold and moist. The two first victims were two artificers belonging to the mission. It soon spread itself, and extended to the Turkish camp, where it made in the end great havock."

"The symptoms which first made their appearance," continues Dr. Witman, "were cold shiverings, head-ache, prostration of strength, with a burning pain in the stomach and in the abdomen, nausea and a bitter taste in the mouth, with abundant vomiting of bloody and bilious matter; a diarrhœa of the same nature; the tongue of a yellow blackish colour; the pulse frequent and full; the skin yellow and burning; respiration hurried. When the fever put on a bad appearance, it was accompanied with delirium; the eyes were inflamed, and the skin often sprinkled with blackish spots. This fever proceeded with more or less rapidity in proportion to the physical and moral state of the patient, his age, way of living, and many local circumstances connected with the state of the atmosphere.

"The wife of General Koehler, Commandant of the

it. It appears to have attacked only the wounded, and may be rather considered as some epidemic affection peculiar to the wounds, than any specific kind of fever. TRANSLATOR.

mission, was the next after the two artificers who was attacked with this malignant yellow fever, of which she died on the seventh day. The General, her husband, who had paid her particular attention, was some weeks after attacked with the same disease, to which he fell a victim on the third day. In the months of November and December, the temperature of the atmosphere being greatly lowered, this fever disappeared, and made way for the plague, with which these two armies entered Egypt, in which country this disease developed itself with so much the greater violence, as it happened to be the season of the *khamsyn*."

There appeared to be a concurrence of several causes which produced this fever amongst our wounded. The first probably was the encumbered situation of the hospital, which under the existing circumstances could not be remedied. To which we may add the circumstance of the patients being lodged on the ground floor of the hospital, the moisture of which favoured greatly its developement. It did not appear in the upper airy wards of the fever patients; the number of which besides was not considerable. The troops likewise which furnished these wounded men were encamped to the west of Cairo, in places low and damp, especially after the retreat of the waters of the Nile, which had been decomposing by reason of the heat, and of the great length of time they had lain there. The sudden transition from the great heat of the days, to the extreme cold of the nights, would necessarily enfeeble the troops, and dispose them to the disease. The atmosphere at this season of the year (that of the khamsyn) is hot and moist, and consequently pernicious to the health of individuals. It is then likewise that the plague rages; and it may be said that the yellow fever, on account of its effects and speedy termination, has some affinity with that disease. The celebrated philosopher, Thunboldt, who has had the opportunity of seeing both the diseases, the first in Turkey, Syria, and Africa, and the second in New Spain, especially at Vera Cruz, has made the same remark. In fact, if we

observe the phenomena of these two affections, supposing them both to be acute, that they attack persons of the same age, the same sex and temperament, we shall perceive, that in the first stage the anxiety and uneasiness of the patient, the head-aches, the pains of the loins and hypochondria, the vomitings, redness of the conjunctiva, burning heat of the intestines, dryness of the skin, hardness and frequency of the pulse, are, with slight variation, the same in the plague and yellow fever.

In the second stage, the prostration of strength, drowsiness, interrupted by delirium, the total suspension of the animal functions, the sensible alterations in the organic functions, marked by dyspnœa, palpitations, convulsive vomiting of black fetid matter, the suppression of the alvine evacuations, involuntary and colliquative stools, irregularity of the pulse, are all symptoms common to both diseases. In this stage, one of these affections is distinguished by a yellowness which diffuses itself over the whole surface of the body; the other by livid spots, petechiæ, carbuncles, buboes, &c. which might equally appear in the yellow fever, but at a much later period: this circumstance is very uncommon however, especially as far as relates to the buboes and carbuncles. The petechiæ frequently appear in the third stage of the disease.

In the third stage of yellow fever, there is an almost total disappearance of the vital power, consequently a paralysis of all the nerves concerned in the animal functions: the sphincters lose their action; the stools are forced; the gangrenous affection shews itself in those parts where there is already a solution of continuity, if there are any; if not, it attacks the cellular and cutaneous substance, the organs of digestion, and in turn all the organs necessary to life; the machine becomes decomposed, and a dissolution takes place terminating in general death.

To the causes above enumerated, we may add, the excessive fatigues of the soldiers, the scarcity of good provisions, especially the want of cooling acid drinks, and the

want of great coats, to protect them from the cold of the night.

The surrender of Cairo having at length re-established all our communications, put us in a situation to form new hospitals, to procure for ourselves fresh provisions and medicines, linen and bed furniture. A great part of our sick were sent off to other establishments. These circumstances, together with the return of the northerly winds, caused the disease to disappear altogether.

Whilst the yellow fever continued acute, and presented inflammatory symptoms with icterus, spasmodic vomitings, delirium, &c. cupping glasses, with scarifications to the back of the neck and upon the hypochondria, were productive of excellent effects. In their place were sometimes substituted small bleedings from the arm, but copious bleedings prove fatal, and the former ought only to be practised with the greatest circumspection.

Tamarind drink sweetened with honey, or a few draughts of camphorated anodyne emulsion, with nitre, taken at night, relieved the thirst, and appeased the intestinal irritation. If by the use of these means a relaxation was produced in the course of four and twenty hours, there was great reason to hope. Under these circumstances the use of cooling, anodyne, and antispasmodic remedies was persisted in, followed by laxatives of neutral salts and calomel, by tonics and antiseptics: emetics would have been pernicious. But if, notwithstanding all these means, the symptoms continued, the disease had always a fatal termination.

But, on the contrary, if the disease made its appearance at first with signs of ataxia, such as prostration of strength, drowsiness, cold shiverings, blackish appearance of the tongue, and constipation of the bowels, then emetics will be found to allay the spasm, to restore the strength of the stomach, and to facilitate the action of tonics and antiseptics. These last we employed with some success, such as the bark, camphor combined with opium, Hoffman's

anodyne liquor, and bitters in suitable doses. The bark however appears to have produced less effect than good wine, sharpened with a little lemonade and æther.

The wounds complicated with these bilious fevers were dressed according to their respective indications. If they were threatened with gangrene, they were sprinkled with bark and camphor in powder. If any appearance of putrescence took place, we made use of vegetable acids, especially of lemons. I likewise ordered lotions of vinegar, strongly impregnated with camphor, to be used over the whole surface of the body.

All those who did not fall victims to the yellow fever, had to struggle with a long and painful convalescence: some even were affected with a relapse of the disease, which destroyed them in a few days. This disease did not spare the wounded Turks; many of which were placed under our care after the surrender of Cairo. A great part of these fell victims to the disease, which unfortunate result may be in a great measure attributed to their bad mode of treatment, and to the privations they had undergone during the siege.

SECTION V.

There appeared reason to believe after the battle of Heliopolis that we should have enjoyed a little tranquillity. We were not long however before we were again attacked. A chosen body of Turkish troops, directed by Sir Sidney Smith, effected a landing on the plains of Damietta, in the neighbourhood of Baghasse; and had it not been for the active care of General Verdier, they would have overrun the country. He engaged the enemy, and notwithstanding their superiority, broke their columns, and after a severe action obliged them to swim off to their vessels.

The painful campaigns we had gone through, the privations and burning heats we had to experience in the Deserts, proved the cause of a considerable alteration in the adipose membrane of the omentum and in the cellular substance, especially of those inclined at all to corpulency, the effects of which extended directly to the liver, which was affected by inflammation, terminating mostly in suppuration, particularly if the patient did not immediately receive medical assistance. The irregularity of the symptoms of this affection, and the insufficiency of the means recommended by medical writers, induced me to inquire more particularly into the nature of the symptoms, in order to discover the causes and the effects, and to arrest its progress. It was necessary to plunge the scalpel into the abdomen, in order to come at the abscesses it produced. These abscesses and the inflammation which produces them are the subject of a memoir, which I have given in the same order as in my clinical lectures at the hospital of the farm of Ybrâhym-bey. The following is a true picture of the disease as I had occasion to observe it.

Of Hepatitis.

Hepatitis begins with a slight attack of fever, accompanied by wandering pains, a kind of temporary dyspnœa, loss of appetite and drowsiness. The heat of the weather and the climate are the principal exciting causes of these first symptoms. They are succeeded, after a course more or less rapid, by a general emaciation, the progress of which is sufficiently quick. The skin becomes dry, the complexion puts on a yellow hue, the abdomen swells, and the process of digestion is slow and difficult. The patient soon feels a painful stitch in the hypochondria, particularly in the right one. In this last situation the pain is accompanied by a sense of heaviness, which is increased by lying on the opposite side, or standing up. The pain becomes more intense by pressure upon the parts, and it often

extends, especially if the inflammation is seated on the convex surface of the liver, along the diaphragmatic nerve, and the accessory nerve of Willis, of the same side, on account of the reciprocal communications of these nerves. It is by this sympathy that the pains of the shoulder are explained, which are not however constant accompaniments, and do not often exist while the inflammation confines itself to the outer edge, or concave surface of the liver. The fever commences with a sense of internal heat, uneasy respiration, severe pains, and often inclination to vomit. The liver acquires such a volume, that it extends beyond the boundaries of the first ribs, and forms an eminence below the hypochondrium. The external parts become painful, and there is commonly a retention of the bile, on account of the abundant secretion of it which takes place on the first invasion of the symptoms, and of the spasm which attacks the intestines and the *ductus choledocus*, in consequence of the heat and the fever.

There sometimes forms below the false ribs a tumor with fluctuation, which may be easily confounded with an hepatic abscess. This symptomatic tumor commonly gives way to the use of the means employed against the inflammation. If this continues to make a progress, the symptoms go on increasing successively to the eighth, ninth, or tenth day at furthest. The pains become severe, the fever strong, and discovers remissions towards night; the urine puts on a reddish colour, and flows with difficulty: sometimes diarrhœa occurs, and the stools are slightly tinged with bile. The secretion of this fluid is suspended. A general yellowness cannot take place, because the bile cannot be absorbed by the lymphatic vessels, and diffused over the exterior of the body. The spleen partakes of this affection; for I have observed, in many subjects, that it becomes like the liver filled with blood, which however gives way to the slightest remedies.

When the inflammation terminates in the formation of matter, the inflammatory symptoms gradually subside, and

give way to those of suppuration. The fever becomes intermittent; shiverings are felt in the extremities; the sense of weight in the part increases; the pains are less acute but throbbing; the tongue white; and when the abscess is formed near the edge of the liver, or towards its concave surface, it projects commonly under the false ribs, so that the fluctuation may be felt externally. If the abscess forms on its convex surface, it points towards the cavity of the thorax, eats through the diaphagm, and distends the pleura, which it pushes through the interstices of the ribs. The matter at last finds its way through the intercostal muscles, and is distinguished through the integuments.

If the abscess is apparent, there will be found a fluctuation in the centre, and the circumference remains hard. The change in the colour of the skin only occurs when a great quantity of matter is accumulated, or when it changes the teguments by its bad quality. In pressing on this tumor, especially in an irritable subject, a pulsation may be felt in proportion to the degree of pressure employed. This circumstance, which I have often observed, might cause the tumor to be taken for an aneurism; this however would appear improbable on considering the magnitude and situation of the arteries of the abdomen and thorax. These pulsations, if slight and permanent, arise from the arteries of the tumor; but if they are the consequence of pressure or of any kind of irritation, they depend on a spasmodic movement which takes place in the cyst of the tumor, or in the neighbouring membranes, where there is a great degree of sensibily arising from the diseased state of the parts; the truth of which is proved by the pulsations disappearing on removing the pressure from the tumor. The accompanying symptoms will likewise distinguish it from aneurism.

Sometimes the inferior lobe of the lungs contracts adhesions with those points of the diaphragm connected with the abscess, by which means the matter becomes discharged by the bronchia. This is however of rare occurrence; it

oftener happens that the matter is effused into the cavity of the thorax, and forms a purulent empyema.

The abscesses within the belly, even when they have passed the boundary of the liver, preserve a cyst, which increases in extent and thickness in proportion to the accumulation of the fluid which forms it. When this accumulation arises at its height, the pus is at length discharged into the superior cavity of the abdomen, which proves quickly fatal; for which reason these abscesses ought to be very early opened.

It sometimes likewise happens, that the sides of the abscess forming adhesions with the stomach, or much oftener with the colon, the matter is discharged into their cavity, and evacuated by stool. Many examples of this kind have happened. We shall have occasion to notice a remarkable case of this kind hereafter.

The burning heat of the day, acting more particularly upon fat persons, sends a great quantity of caloric into the fat, liquefies it, and increases its hydrogen; so that the fat, particularly of the omentum, is taken up into the circulation. The liver in particular suffers from this change; it would seem that the principles of the fat are carried more immediately to this viscus, where the excess of hydrogen and carbon exciting heat and irritation, produce obstruction and inflammation,

It is thus that, in order to procure the large livers of geese intended for the table, they shut up the animals well fattened in narrow cages; after which they are exposed to a graduated heat, deprived of every kind of provision and even water. A febrile action ensues; the fat undergoes a kind of fusion; the liver becomes gorged, and acquires an enormous bulk. It is esteemed to be in the most desirable state, when the animal is arrived at the greatest degree of leanness, and the fever at its height.

Excess of wine and spirituous liquors are the bane of health in Egypt. These, together with the heat, have been the principal sources of diseased liver: they stimulate the

organs of digestion, which possess an unusual degree of sensibility in hot climates. Frequently they produce diarrhœa, the sudden suppression of which occasions hepatitis.

The brackish water appears likewise to have contributed to the production of this disease, as the regiments stationed in those quarters where it was necessarily used furnished the greatest number of hepatic abscesses. To these causes may be added, the suppression of perspiration, produced by the sudden transition from heat to cold, the excessive fatigues of the campaigns, the immoderate use of mercurial friction for venereal complaints, bleedings unnecessarily undertaken, and strong purgatives or emetics. Persons of temperate habits, and of a dry temperament, were generally exempt from this disease.

The prognosis varies according to the character of the hepatitis, the state of the patient and of the weather. The season of the khamsyn is unfavourable to every disease, but particularly to those of the liver; their progress is then extremely rapid and fatal.

Whilst the inflammation is not far advanced, resolution may be accomplished; but if the abscess is once formed, there is no resource but to wait for its suppuration, and give an exit to the matter.

In the first case blood-letting becomes necessary, which ought to be regulated by the degree of plethora in the patient, by his strength, and the violence of the inflammation. In general, blood-letting is less indicated in hot than in cold climates, for which reason great circumspection becomes necessary in the employment of it.

If the patient is weak, leeches may be substituted; and if they are not to be had, cupping glasses with scarifications. Cataplasms applied to the part relieve the pain, and facilitate the emptying of the vessels. To these should succeed anodyne clysters, camphorated and nitrated emulsions, the use of acidulated and cooling ptisans, and washings of the whole body with warm water and vinegar.

After two days of this kind of treatment, the patient

should be made to take in the morning some whey clarified and sharpened with fumitory, and cream of tartar; the clysters should be rendered purgative, and a small quantity of tamarind added to the drink.

When resolution takes place, the fever subsides, the heat and pain diminish, the external swelling, if any, gradually disappears.

In consequence of the relaxation of the parts, the secretion of bile is restored; it glides into the intestines, and restores the alvine excretions. The continuation of these means, with a low diet, produce a perfect cure.

If, after the cessation of these symptoms, resolution still seems to take place with difficulty, a blister should be applied to the hypochondrium.

Toward the end of the cure I chiefly administered gentle purgatives of the neutral salts, by the continuation of which means, varied according to circumstances, resolution was accomplished. The epispastics applied to the hypochondrium ought to be composed of euphorbium, or of any substance rather than cantharides, which will produce the effect. The cantharides in exciting the solids decompose the fluids, especially where there is putridity, or a bilious diathesis. In short, the patients on whom they were applied, experienced a greater difficulty in their recovery; the disease became complicated with putridity, and their convalescence was long and painful. The celebrated Dumas, professor at Montpellier, proves by a series of observations and experiments, that cantharides are hurtful in all bilious affections.

If the inflammation resists all these means, it only remains to assist nature in quickly establishing suppuration, to which end the patient must be supported by appropriate medicines, emollients must be applied externally, and the bowels kept open by clysters. If the abscess bursts into the cavity of the abdomen, the patient is in great danger of his life. It is however possible that the matter, communicating with the cavity of the colon, by means of inflammation,

may pass out with the stools. In this case repeated clysters, nourishing diet, and slight stomachics, may assist the operation of nature. But if the abscess should discharge into the cavity of the chest, the operation for empyema must be performed, and the patient treated as in other similar cases.

If the tumor manifests itself externally in any point of the hypochondrium, with a sensible fluctuation; if it is certain that it is not formed by the distension of the gall bladder from retention of the bile, the opening of it ought to be undertaken. The ancients being afraid of hernia as the consequence of this operation, employed the actual or potential cautery to open these abscesses. This mode of proceeding however is attended with many inconveniences. The most eligible method is to employ the scalpel, with which an opening should be made through the integuments in the most convenient direction, the muscles and membranes should afterwards be cut, and the cyst opened to such extent as may be necessary for the discharge of the matter, and in its most depending part, taking care not to touch its adhesion with the corresponding portion of the peritoneum. There is no reason to be afraid of too large an opening, nor of giving vent to the whole of the matter at the first moment, if it can possibly be done. The fluid discharged is most commonly of a grayish colour; however that is not always the case. In order to facilitate the discharge of the matter, the patient must be placed in the most favourable position, and the belly gradually compressed by means of a bandage. The dressings should be simple and frequently renewed.

It is by no means necessary to use injections to the opening, as some practitioners have advised; they are apt to lacerate the delicate contexture of the liver, and produce hæmorrhages. During the first days the discharge is profuse; after a while the colour of the matter undergoes a change and becomes laudable, from which moment the abscess of the liver may be considered as deterged, and in the

way of cure. The dressings ought to be of dry lint till this period; after this, wine with honey should be employed, and a tent of soft linen dipped in the same should be inserted into the lips of the wound, to prevent their closing before the healing of the interior parts. Bitters should be given internally to the patient, and the most assiduous care shewn to him to the end of the cure. I shall give some instances of cures obtained by these means.

A serjeant of the 22d demi-brigade was admitted into the hospital with all the symptoms of hepatitis. He had been weakened by the use of emetics and purgatives. Suppuration quickly formed in spite of the means employed to prevent it. A few days after, I perceived a fluctuation beneath the cartilage of the last true rib, near the rectus muscle. To these symptoms were added all those indicative of hepatic abscess. The two first days emollients were employed externally, and afterwards I proceeded to the opening of the abscess. I laid open the integuments and cellular membrane by an oblique incision extending from the attachment of the rectus muscle to the cartilage of the rib at the bottom of the tumor. This incision laid bare the great oblique muscle, which I divided parallel to the fibres, and discovered the tumor, which might have been taken at first for an aneurism, as I have observed above. I then decided, notwithstanding its pulsations, to plunge the bistoury into the tumor. A great quantity of matter flowed from the opening, of the colour of lees of wine, mixed with purulent flakes of a whitish colour. I enlarged the opening above and below, and introduced my finger into the seat of the malady. I found a considerable and deep erosion in the middle lobe of the liver, near the *ligamentum suspensorium*.

From this moment the patient found himself relieved; the discharge during the first days was very abundant, and of the same nature; at length its quantity diminished, and it shortly after changed its colour. The cure was completed on the forty-seventh day from the opening of the tumor.

A soldier of the 69th was received into the same hospital with a similar affection. The abscess was opened as soon as the fluctuation became sensible. The same proceedings and the same treatment were employed, and he was cured in less than four months.

In a grenadier of the 88th, the hepatic abscess, which was formed on the convex surface of the liver, made its appearance between the ribs in the lower part of hypochondrium, where the fluctuation was felt. I laid it open, and had an opportunity of ascertaining the course of the matter, which passed from the liver into the thorax, piercing the diaphragm, which I found perforated opposite the interval between the sixth and seventh rib. The course of this abscess was the same as the preceding, the discharge was of the same colour, and the patient cured by the same means.

From ten to twelve similar cases occurred in the same hospital, and the disease terminated in the patients affected with it just in the same manner.

I was called to visit the wife of a serjeant of miners, on account of a painful tumor which she had on the right hypochondrium. This tumor had a very sensible pulsation below the edge of the false ribs; it had a fluctuation in the centre, and was extremely painful all round. The patient had felt for some days pains which resembled colic, originating in the tumor, and extending towards the pelvis. This general irritation induced me to suspend the opening of the abscess. I prescribed only emollient clysters, which gave great relief, cooling drinks and anodynes, with emollient cataplasms to the tumor. After pursuing this treatment two days, the patient experienced all at once violent pains in the lower part of the abscess, which were followed by copious and frequent stools, composed almost entirely of a purulent matter, resembling that from the abscesses of the patients above mentioned, which procured instant alleviation of the symptoms. The tumor sensibly diminished; the pains subsided; and the purulent matter continued to

pass by stool. Nature was assisted by means of emollient clysters, proper regimen, and slight bitter tonics taken internally. This circumstance, although extremely favourable, ought not to prevent surgeons from following the precepts here laid down for hepatic abscess, while it is within the reach of assistance from art; for it very seldom indeed happens, that a crisis is established so favourably.

A corporal of the 4th demi-brigade of light infantry, afflicted with hepatic abscess, remained a long time in barracks where this disease was not rightly understood. He only arrived at the grand hospital in the last extremity. The circumstances which had preceded his admission, and the symptoms of an effusion of matter into the chest, determined me to perform the operation for empyema, between the sixth and seventh rib, reckoning from below upwards. I discovered the seat of the abscess; and a great quantity of brownish coloured matter was discharged from the opening, mixed with whitish flakes. The patient, who was before almost suffocated, began to breathe more freely: the oppression was diminished, but the prostration of strength continued the same. After some days of quiet and profuse suppuration, the patient died quiet exhausted.

On opening the body, I found the pleura and a small portion of the lungs ulcerated. An opening about the size of a six-pence was perceived above the tendinous expansion of the diaphragm, which communicated with the middle of the convex surface of the liver, where there was a deep ulceration. Had the opening been made immediately after the effusion of matter into the chest, the life of this soldier might have been saved; particularly, as a tumor, the size of an egg, with evident fluctuation, was perceived several days before his admission to the hospital.

Pierre Cinna, a gunner of the 4th regiment of artillery, was received into the hospital on account of obstinate dysentery, which had resisted the efforts hitherto made for its cure. The astringent medicines which were immediately given him, stopped his dysenteric flux; and a *metastasis* to

the liver instantly succeeded. The patient complained of acute and deep-seated pains in the hypochondrium, with a general uneasiness and difficulty of breathing. To these succeeded constipation, internal heat, ardent thirst, fever, restlessness, and increase of pain, and in a very few days a hard elastic tumor, very painful, appeared below the edge of the false ribs near to the *xiphoid* cartilage. There was no change of colour in the skin; but in twenty-four hours after, a point of fluctuation was perceived near its centre. The inflammatory symptoms now gave way to those denoting suppuration, such as throbbing pains, irregular shiverings, slow fever increasing towards night, paleness of the countenance, prostration of strength, and increase of the tumor. Such was the situation of the patient when I first saw him. As soon as I had ascertained the existence of the abscess, I lost no time in proceeding to lay it open, for fear of its bursting into the cavity of the abdomen. I plunged my bistoury into the point where the greatest fluctuation was perceived, and laid it open about two inches. A vast quantity of gray or brownish matter issued out, mixed with whitish and cellular flakes. I examined with the finger the seat of the disease; it extended upwards to the middle lobe of the liver. At the first dressings the suppuration was very abundant, and of the same colour, but it soon after changed its appearance, and by degrees diminished in quantity. The topical applications were assisted by bitter stomachic drinks. The patient recovered strength; the ulcer became clean; the sides of the cyst came away; the edges contracted; and in the space of six weeks the patient was discharged cured.

This disease, considered by the greatest number of writers as always fatal, may be prevented, by avoiding in the day the impression of the sun's rays, and the cold damp air of the night; by a moderate use of wine or women, or strong liquors; by frequent ablutions of the whole body with soap; by taking some bitter infusion in the morning, and acid

drinks during the day; by moderating as much as possible the exercise taken on foot; and, especially, avoiding violent affections of the mind, the effects of which are principally felt upon the biliary organs.

It will be a more difficult task to explain by what means the influence of the climate of Egypt could co-operate with the slightest local causes, to effect the gradual and almost insensible destruction of the organs of generation. I shall content myself with describing the effect of this accident, and making known its phenomena in the following memoir :—

Of Atrophy of the Testicles.

A number of the soldiers of the army of Egypt, on returning from the campaign of 1799, complained of the almost total disappearance of the testicles, without any venereal cause. Astonished at this phenomenon, of which I had never before seen any example, I used every method in my power to discover the cause and understand the progress of this singular malady; the symptoms, such as I have observed them, I shall lay before the reader.

The testicles lose their sensibility, grow soft, gradually diminish in bulk, and appear to dry up. For the most part the disease begins in one of them at a time. The patient is not a ware of this destruction, which operates insensibly, before the testicle is reduced to a very small bulk; it is then found drawn up towards the ring, of the shape and about the size of a white kidney-bean. It is indolent, and of a tolerably hard consistence. The spermatic cord is likewise shrunk, and partakes of the atrophy.

When the two testicles are in this state of atrophy, the man becomes deprived of the generative faculty, of which he becomes conscious by the absence of desires and amorous sensations, and by the relaxation of the genitals. In fact,

all the patients who have suffered from this affection, have never after felt any desire for the venereal act; and the influence of this loss is felt in all the interior organs of life. The lower extremities shrink and stagger in walking; the face changes colour; the beard grows thin; the stomach loses its energy; digestion becomes difficult and laborious, and the intellectual faculties are deranged. Many of these soldiers in consequence of the above affections, have been invalided from the service.

I attribute this disease principally to the great heat of the Egyptian climate, which by softening the texture of the testicles, disposes them to decomposition. The most fluid parts of this organ are determined externally by perspiration; another portion is absorbed by the lymphatics, and carried into the mass of the circulation. The parenchyma of the vessels, which resists these first effects, subsides and retracts; the tubes become obliterated, and dry up; the whole mass of the testicle loses more or less of its volume, and wastes away.

To this principal cause may be added the fatigues and privations of war, but especially the use of brandy made from dates, to the composition of which the inhabitants of the country add the fruit of several species of *solanum* to increase its strength and improve its flavour. Perhaps also, either experience or tradition may have taught them, that these substances modify the nervous sensibility, which developes more easily in hot climates, and consequently becomes susceptible of greater mobility.

Physiology teaches us that there exists a great sympathy between the stomach and testicles, so that any irritation of these organs frequently produces a spasmodic movement of the stomach, followed by pains, anxiety and vomitings. In the same manner affections of this viscus destroy the energy and integrity of the testicles. It is moreover possible that the solanum exerts its stupifying effects indirectly on the testicles. The ancients succeeded

in wasting them away by the long continued application of the inspissated juice of hemlock to the scrotum.*

I have remarked that the juice of the *bella-donna* in an instant paralyses the organ of vision. I have ascertained this fact by several examples. It is then necessary to be extremely circumspect in the employment of *solanum* in a hot climate, which appears to me to be very pernicious.

When the atrophy of the testicles is complete, there is no resource in art against it; but if the disease is only incipient, its melancholy effects may be prevented by the use of vapor baths, dry frictions over the whole surface of the body, urtication of the posteriors, cooling and stomachic medicines, and good living. This disease may be prevented by avoiding spirituous liquors, particularly the date brandy made by the Egyptians. A suspensory bandage should also be worn tolerably tight, and the whole surface of the body should be frequently washed with fresh water and vinegar; at the same time it will be necessary to abstain from immoderate connexions with the female sex.†

* Vide *Marcellus Empiricus* experientiâ, p. 33.

† Since our return from Egypt, I have had occasion to observe this disease in some soldiers of the imperial guard. The symptoms were precisely the same as in Egypt; and the patients themselves acknowledged, that it arose from the same cause, the immoderate use of spirits and women.

In one of these cases the disease in a very short time arrived at its greatest height, in such manner, as to cause the testicles entirely to disappear. This subject was of a very robust constitution, with a strong thick beard, and features strongly marked. Since the disease he is become effeminate, with no beard, weak shrill voice, and deprived of the generative faculty.

SECTION VI.

The reduction of Cairo promised us repose for some time, in the hope of which, I again opened my course of surgery and anatomy. The clinical lectures afforded always new subjects of instruction to us.

The next disease we had occasion to notice amongst the troops was the leprosy, caught from the inhabitants, particularly from lying on their beds. I had also frequent opportunity of observing among the natives the elephantiasis. As these two diseases are much confounded by authors, I applied myself closely to study their symptoms, and to distinguish their difference.

Of the Leprosy and Elephantiasis.

The physicians who have written on leprosy and elephantiasis, such as Hippocrates, Galen, Aretæus, &c. are not agreed as to the proper character of these diseases, or the difference that exists between them. I shall not here enter into an examination of their respective opinions; that would lead me into too long a discussion, and draw me from the end proposed, which is to give a precise account of these two diseases as they exist in Egypt; neither shall I speak here of such diseases as may have been noticed in Europe or other countries, and supposed to bear some analogy to the leprosy and elephantiasis; for I consider those diseases as peculiar to hot climates, and more especially to Egypt; or at least I am of opinion, that if they are transplanted into other countries, they assume there a different character. Experience has also taught me, that the leprosy and elephantiasis differ essentially from one another, although

they present some symptoms in common. According to this principle, I shall present the history of them separately.

Of the Leprosy.

The leprosy of Egyptians confines its attacks to the skin; it makes its appearance at first with wandering pains in the limbs, difficulty of walking, and a general lassitude and debility. The patient falls into a profound melancholy. In a short time bluish pustules begin to shew themselves, wrinkled at their summits, and collected into patches of various sizes: they generally appear on the face and extremities; rarely on the breast or belly: the buttocks and knee-joints are the most affected. These pustulous patches dry up, and furnish a blackish crust; from beneath which flows out a serous yellowish humour, of a very fetid smell; the breath of the patient exhales the same kind of odour; the pulse is feeble; the urine abundant and sandy. To these first symptoms, as the disease advances, succeed a slight difficulty of breathing; the face assumes a kind of bronze colour: the skin of the body becomes unequal, wrinkled, and impervious to the perspirable fluid; it loses its sensibility in those points where the above mentioned eruptions are; the lips grow thick; the nostrils dilate; the nose sinks; and the nasal mucus becomes thin and ichorous: the tears are acrid, ulcerate the borders of the eye-lids, and frequently run over the cheeks. The patient becomes evidently wasted. The pustulous eruptions increase progressively and become blacker: sometimes they extend themselves by running into one another. These leprous crusts do not cause any itching, as do the herpes, which they somewhat resemble. The patients complain of pains through their limbs, particularly at the bones and joints. The disease may remain for years in this situation, or finish its career in a short time. In the latter case, the small ulcers concealed under the leprous crusts, become

larger, and attack the cellular texture. The parts of the skin which are affected, acquire some degree of thickness, and lose entirely their sensibility, in such a manner that some shreds of the *derma* fall into a mortification, and they may be cut off without any pain. A hectic fever attacks the patient; he falls into a *marasmus*, and sinks insensibly. Sometimes the ulcers attack the joints sufficiently deep to destroy the ligaments, and thus bring about *necrosis* and the loss of the limbs.

I saw at Grand Cairo several lepers, who kept themselves isolated from society, and whose leprosies presented all the symptoms I have detailed. Several soldiers of the army contracted the disease from the same causes, which, without doubt, produced it in the Egyptians. The symptoms were the same in both these classes of patients, with the exception of some differences in the seat of the pustules, in their extent and character. As to their colour and form, they are constantly the same. The general affection is more or less severe according to the idiosyncrasy of the patient, and several other particular circumstances.

This disease appears to me contagious, where the ulcers are deep and extensive, and the patient already much debilitated. In this case a nauseous and fetid odour exhales from the ulcers and from the whole surface of the body, so that one cannot breathe near them a few minutes without being incommoded. The linen and clothes which have been worn by lepers, appear to become impregnated with a deleterious substance, calculated to produce the same evil in the person that should chance to wear them, if he should be predisposed to its absorption. The knowledge of these facts, and the advice which the ancient Arabian physicians give, to have these lepers isolated, induced me to treat our soldiers affected with this disease separately in our hospitals. Nevertheless, circumstances not always allowing me to isolate completely these patients, I have seen persons who have contracted the disease, after different communications with the sick: thus, during the siege of Alexandria, whilst

attending an officer for a very clearly marked leprosy, I observed that another officer, from whom he was kept sufficiently distant, though in the same ward, but with whom he had frequent communications, was affected with the same disease, which was complicated with a wound almost completely cicatrized, resulting from the amputation of the left arm. The cicatrix was at first covered with a thick yellow crust, furrowed with deep chinks, from which flowed an ichorous and fetid humour. The edges of the stump became of a blueish colour and insensible; the rest of the limb swelled, and became hard, and the skin partook of the blue tinge. Soon after leprous pustules made their appearance in different parts of the body, principally upon the elbows, legs and face. The slightest movements caused the patient the most violent pains in the extremities; his face became hideous, his skin dry and wrinkled. He ate little, and had a depraved taste: his strength decreased; he became emaciated to the utmost degree, and finished at length his career, after having passed the last days of his life in a frightful state of disquietude, uneasiness, and anxiety, difficult to describe. This officer, according to his own confession, had never had any venereal affections or herpetic eruption; his way of living had always been sufficiently regular, and much better than that of the soldier. The wouud of the stump had been deranged by no accident, until the moment that the cicatrix was about to close, when the leprosy appeared; for which reason I am induced to believe that it took place by contagion.

The sudden invasion of this disease which I witnessed in the person of one of the guides, and which I shall detail hereafter, appeared to me an incontestible example of the effects of this contagion.

I have never seen the leprosy complicated with the elephantiasis, which I believe to be, as I have already asserted, a different disease. The following are the appearances presented on dissection of the o fficer abovementioned. The liver was hard, of preternatural bulk, and

a deep brown colour; the gall-bladder contained a very small quantity of a very thick bile of a bottle green colour: the spleen was larger than natural, and apparently schirrous: the other abdominal viscera were discoloured, and in a great state of relaxation: the mesenteric glands were choaked; the small intestines were sprinkled over with hard tubercles; the cellular membrane was nearly annihilated, of a yellow colour, and filled with whitish tubercles, which were hard, and bore some resemblance to the ulcers: the skin was hard, like parchment, and without elasticity.

Degenerated syphilis, or herpetic affections, appear to be the predisposing causes of leprosy. Some of our soldiers after having been several times under treatment for venereal affections, accompanied with obstinate cutaneous pustules, when to all appearances cured, were in the end affected with very clearly marked leprosy; which has however given way to the treatment which we shall describe.

Salted meats, salt fish, and onions, which last are eaten in great quantity by the people of this country, may be regarded as secondary causes in the production of this disease, to which we may likewise join the flesh of pork and of the wild boar, even when not salted; for we have often noticed, that the French who had been feeding for some time on these meats, were affected with it. A very great number were attacked with leprous eruptions on the face, more particularly on the nose, the shape of which became hideous; they afterwards made their appearance on the upper and lower extremities; and in the end, on the whole surface of the body. There is no doubt but the flesh of these animals, being differently fed to the hogs in Europe, contains mischievous principles, which indeed is proved by its rapid decomposition when exposed to the strong heats of an Egyptian climate. Without indulging in further conjectures, it is clear that this meat is unwholesome; and it is probably from experience of this fact, that the Jewish and Mahometan legislators have forbidden its use. To these causes we may add, the uncleanliness of the inhabitants of

Egypt; and the almost infectious impression which the poorest class receive from the contact of an infinite number of extraneous bodies, by sleeping almost naked on the ground during the summer; this likewise accounts for the richer sort, who keep themselves always clean, and are sheltered from the vicissitudes of the climate, being exempt from the leprosy, unless they chance to take it by contagion, which however seldom happens, as they guard themselves against it with the utmost precaution.

I have seen no other person die of leprosy but the officer whom we have spoken of; but I am of opinion with Avicenna and Aretæus, that the leprosy is a very severe, if not a dangerous disease, when arrived at its greatest height. It is beside at all events extremely disagreeable and obstinate; it requires the greatest care and an extremely long attendance.

The modes of treatment adopted in this disease, have been as various as the physicians who have been employed about it. Experience has taught us that mercurial preparations, so much extolled by some, have exasperated the symptoms, even in those patients who were labouring under syphilitic affections, although that disease sometimes induces a predisposition to leprosy. So much does a disease when degenerated require a different mode of treatment to what may be specific in its original state. In short, we have cured a great number of degenerated venereal diseases only by the use of bitters, bark, opium, camphor, and other tonics. The leprosy, which I look upon as an asthenic disease, but of a peculiar kind, requires an analogous treatment.

In order to explain better this treatment, I shall consider the disease in four different stages. In the first of these there exists a turgescence of the humours, and the eruption begins. In the second, this becomes complete: the strength of the patient decreases. In the third, the pustules are covered with a blackish yellow crust, and the diseased parts are deprived of their sensibility. In the fourth, the crusts fall off, and discover fungous ulcerations, of a

reddish violet colour, accompanied with a deep seated smarting, and from which is discharged a fetid yellow sanies. There exists great prostration of strength, marasmus, hectic, and sometimes colliquative fever.

In the first stage, a few leeches to the verge of the anus, whilst there exists any obstruction in the venous system of the abdomen, will produce a salutary evacuation of the vessels. Having no leeches in Egypt, we have employed cupping with scarification, both to this part, and to the hypochondria. This method appears to be far preferable to common bleeding, which in general is not indicated in hot climates, especially in Egypt, and more particularly in the leprosy.

An emetic, by the shock it gives to the stomach, greatly facilitates the action of other remedies. After this some mild purgatives may be employed; to these may succeed the use of warm baths, emollient clysters, bitter and mucilaginous drinks; such as whey sharpened with fumatory. During the day an infusion of bitters; and at night a camphorated antispasmodic draught. The diet ought to be sweet and moistening, composed principally of milk and vegetable substances. Such are the means best adapted to the beginning of the disease, and by which we have arrested its progress in a number of our soldiers. Upon the eruptions it will be proper to apply a little softening ointment, such as the cerate of saffron.

In the second stage, the mucilaginous drinks must be discontinued, and the strength of the bitters increased. The red sulphur of antimony combined with the extract of fumatory and muriate of ammonia; boluses composed of small doses of camphor and opium at night, have been productive of the best effects. Should the patient only be seen in the second stage of the disease, these medicines must be preceded by gentle purgatives, and two or three warm baths, in order to soften the skin and the pustules: a greater number of baths would diminish or destroy the

effect of the medicines. The use of the cerate should likewise be persisted in.

In the third and fourth stages, to the remedies already proposed, must be added the *diaphoretic syrup* into the composition, of which should be received some aperient roots. The doses of these should be gradually increased as well as those of the opium and camphor. The diet must be stomachic and stimulant. The patient should drink good wine, but in very moderate quantity: Moka coffee with sugar is likewise advisable: he must however abstain from all indigestible meats, and use as little salt as possible with his food. He ought, as much as possible, to breathe a pure air, and take moderate exercise. Lastly, he should employ frequent washings with vinegar and lime-water over the whole surface of the body; and his bed and apartment should be fumigated with strong vinegar. This treatment should be persisted in according to circumstances, until some advantage is obtained.

When the general vice of the system has been destroyed, or considerably weakened, which may be known by the decrease of the symptoms, the leprous crust should be removed either with scissars or a bistoury, if it has not already fallen: the disorganized skin should likewise be removed completely. This extirpation is effected without pain; it is only accompanied with a slight effusion of blackish blood. The ulcers resulting from this operation should be touched with the actual cautery, which should be repeated on several following days, until the subjacent parts have recovered their lost tone and vital powers.

The patient will be found to gain strength from day to day, and to become plump: the ulcers at the same time will grow clean and cicatrize. We have already observed that the cicatrices remain of a blueish colour, and become painful whenever the atmosphere is moist; in which case they require to be fortified with alkaline lotions. The patient feels at the same seasons pains in the limbs. With

the exception of these slight infirmities, the treatment here described continued for a long time, has succeeded in obtaining us complete cures of all those who were attacked with leprosy, unless in the case of the officer who had suffered amputation.

The daily dressings consisted of a solution of the oxyde of copper, of alumine, and a little sulphuric acid. The treatment above described was particularly successful in a number of leprous patients, and particularly in the case I am about to report, which seems to leave no doubt as to the true character of the leprosy, or as to its contagious nature.

Charles Fourrat, a man of robust constitution, who had never been affected with venereal disease, was attacked, during the siege of Cairo with a pustulous eruption, which appeared in different parts of the body. He knew not to what cause to attribute these appearances, being of sober manners, and never having lived on bad provisions. He remembered however having lain on a bed taken out of one of the houses in the neighbourhood of Cairo, in which he had observed a woman covered with blackish scabs from head to foot, and who appeared to him to be very ill. There was no reason to doubt that the mattress in question really belonged to that woman, and had communicated the disease. These pustules, at first distinct, though arranged in groups, at length united, and appeared only in large blotches, of a blackish colour, and covered with thick scabs, which were of a yellowish brown. They were divided by deep chaps, from which flowed an ichorous matter of a very fetid smell.

In the first instance the patient, according to his own account, felt only slight smartings in the pustules, which were at first red, wrinkled at their summits, and surrounded by a purplish disk. He had wandering pains in all the limbs, and in the hypochondria, general debility, lassitude, and disgust. On being taken to the hospital, it was imagined that the disease exhibited the character of syphilitic

pustules, although the patient protested, that he had not been exposed to the danger of contracting venereal disease. Mercurial frictions and other anti-syphilitic remedies were prescribed; but their ill effect was soon perceived. The general pains increased; the pustules became puffed up, and extremely painful; and the irritation became so great, that the patient could not obtain a moment's repose. He was totally deprived of sleep, and suffered incessant pains, which were relieved by antispasmodic and composing medicines. After persisting in this treatment for some time, he was discharged from the hospital without being cured; his pustules were considerably extended, and his body greatly weakened and emaciated. Some other treatment was afterwards adopted, notwithstanding which the disease made great progress. This patient having departed with the division of Cairo for France, was sent on shore at Malta with several others. His frightful appearance induced a belief in the health officers that he was affected with the plague. (In short, these pustules were not much unlike the pestilential carbuncle). He was put under quarantine, and a few days afterwards was sent to the Lazaretto at Marseilles, where he remained two months. It was however discovered that his disease was not pestilential, for which reason he was liberated, and arrived at Paris towards the end of March 1802.

He was weak and emaciated; the colour of his body resembled copper; the eyes were dim and sad; the eye-lids heavy; the nostrils dilated; the lips thick and purplish; the gums pale; the nose sunk in; the breath fetid; the skin of the face shrivelled; breathing rather laborious: the breast and abdomen were in their ordinary state; the extremities lean and benumbed. He ate little; his taste was depraved; he complained much of lassitude, pains in the limbs, and hypochondria. The pulse was feeble, but without fever.

The elbows and knees were covered with blotches of a blackish colour, with thick scabs covering fungous and

sanious ulcers. The edges, formed by the detached integuments of the ulcer, were thin and insensible, which insensibility extended to some distance. The patient experienced some slight smartings about the bottom of these ulcers: he had some tumors on the buttocks and on the right thigh; the digestive functions were greatly deranged; he enjoyed no sleep, or was tormented with uncomfortable dreams, and was in a perpetual state of melancholy.

By the above account which I received from M. Boussenard, it will be seen, that the disease was now at least in its third stage. After having prepared the patient by some slight purgatives, I put him on a course of bitter diaphoretic drinks, with the wine of cinchona in the morning in tolerably strong doses, some syrup which I had prescribed for him towards evening, and a bolus of camphor and opium at night. These means were alternated with preparations of sulphur and antimony. I effected the removal of the scabs which covered the ulcers by the use of emollients, and dressed the sores during the first days with an anodyne ointment.' The diet of the patient was sweet and nourishing; he was allowed a little Burgundy wine; and contrived during the day to take a short walk with the assistance of crutches.

After two months of this treatment, which was modified according to circumstances, the pains subsided; the smartings felt at the roots of the tumors, disappeared; the patient's strength returned; the sores became clean; but the surrounding skin remained in the same condition, which obliged me to cut away all of it that was disorganized. This operation was attended with no kind of pain; there was only a slight effusion of a black oleaginous blood. I instantly applied the actual cautery, and repeated its application several times: the last applications only were attended with any pain. I assisted their effects by lotions of hot wine, &c.

After the second application of the cautery, the flesh became red and sensible; and the skin resumed its elasticity

and sensibility. The cicatrization was effected by degrees; and the 4th of July the patient was discharged cured. The features of the countenance had regained their original form; his jolly appearance returned; but the cicatrices, which are large, remain of a purplish colour, and cause shooting pains, on every change of temperature.

Of the Elephantiasis.

The elephantiasis appears to belong to the class of lymphatic diseases; it attacks the skin and cellular membrane of the lower extremities; and gives to these limbs a bulk so monstrous, and a form so hideous, that they have been compared to the feet of an elephant, from which appearance its name has been given. This disease differs in many respects from the leprosy: it commences however like the leprosy with a general lassitude, a weakness in the lower extremities, and a difficulty of performing the motion of these parts. The soles of the feet become extremely sensible, and the patient feels severe pains on the slightest locomotion along the course of the bones; he experiences a general disgust and uneasiness; his face changes its colour; the lips grow thick, and the gums become pale.

The feet and legs grow big from the distention of the skin and cellular membrane, and are covered with a small, distinct, miliary eruption, of a reddish violet colour. These pimples ulcerate, and the ulcers or chaps become covered with blackish crusts, very thick and unequal. The discharge which flows from these chaps or ulcers, appears of the same nature as that observed in leprosy. The skin of the leg becomes marbled from the great number of small varicose veins which appear on its surface. The extremities lose their sensibility, grow gradually bigger, and in proportion to their increase acquire a considerable degree of density; for in pressing them a great resistance will be felt: no impression remains from the finger, as in œdema, from

which disease the elephantiasis differs beside, with respect to the diminution of heat, and the sensibility which is preserved in that affection: in elephantiasis, however, the heat increases according to the progress of the disease, to such a degree as becomes extremely troublesome.

The ulcers increase in size, but very little in depth; the skin of the feet and legs acquires a considerable thickness; the nails become disorganized, and are converted into yellowish scales; the cellular membrane is thickened, and becomes hard like the fat of bacon; that likewise which is found in the interstices of the muscles, experiences the same change, by which the moving fibre is compressed, the spring of which is weakened, and the contraction rendered almost null. Motion and sensibility gradually become extinct; and when the disease has risen to a very high degree, the feet and legs become a shapeless mass, heavy, and almost paralytic. The patient is under the necessity of remaining in a state of rest; the body wastes, the face becomes tawny; the lips thick and generally chapped; and the breath fetid, the same as in the leprosy. An eruption of an herpetic nature makes its appearance on the scrotum and the insides of the thighs. The features of the countenance, excepting only the lips, undergo no change; the eyes are even lively and bright; the skin of the back becomes white, and shining, when rubbed, but does not peel off as in the leprosy; the hair preserves its natural appearance; the beard, instead of falling off, as in leprosy, grows thicker upon the chin; the pulse continues in its healthy state. The elephantiasis does not destroy the appetite; it is not contagious, but may be hereditary; and according to Bruce, does not make its appearance until the time of puberty, and sometimes later. The natural functions are not much deranged, or even at all; and the patient may live with this complaint even to decrepid old age. This is not the case with leprosy, although it may be of long duration; it increases by degrees, and almost always terminates fatally.

The glandular disease of Barbadoes has some analogy with the elephantiasis, although it presents symptoms not observed in this last complaint, such as the inflammation which appears from the first attack of the disease along the course of the lymphatic vessels, and the fever which accompanies it throughout all its progress. The tumor does not present the same appearance as the elephantiasis, in which the skin is wrinkled, and, at the joints, covered with blackish tubercles, interspersed with fetid sanious ulcers.

In other respects, there appears to exist a great similarity in the origin and the consequences of these two affections. They may therefore be both of the same nature, but rendered different by the effect of climate and a diversity of causes; nor are these differences perhaps yet sufficiently well marked, to be regarded as essential, and to determine the line of demarkation which exists between the two diseases.

It appears extremely probable that the elephantiasis attacks at first the whole system; but by particular causes which we shall attempt to explain, it exerts its principal effects upon the legs, where it seems to fix, and become local, like to the scrophulous affection, which, when it has effected a deep ulcer on one of the extremities, often concentrates itself there altogether, and becomes a local disease, which can be removed by amputation.

Those who work in the rice grounds, and the inhabitants of marshy districts, are the most liable to this disease. Its predisposing causes are nearly the same as those which produce leprosy; to which may be added the immediate, and more or less continued impression made by the humid gases, or corrupted waters upon the feet and legs, such as the waters of the rice grounds, which are extremely unwholesome, on account of the continual decomposition of vegetable and animal substances which takes place in them. These causes appear at first to relax the texture of the skin, afterwards they tumefy and disorganize it.

I saw at Damietta a great number of husbandmen who

were affected with this disease in different stages; whilst in dry and wholesome places it is scarcely known, as in Upper Egypt, and on the borders of the Desert: but it is to be met with again according to Bruce in the marshes of Abyssinia. The leprosy, on the contrary, exists principally in the desert parts of Egypt. I have never seen it near the sea coasts, where elephantiasis is frequent.

The elephantiasis may be considered in three different stages; in the first of which the feet and legs are slightly tumefied, covered most commonly with a miliary eruption, scarcely discernible, of a reddish brown colour, with slight painful prickings, increase of heat; irregular pains, especially in the soles of the feet. If the skin is pressed, it gives pain, and no impression remains from the touch. The motions are performed with difficulty.

In the second stage, the eruption is succeeded by small ulcers covered with a thick scab, yellowish, and resembling tubercles. The skin is variegated with varicose veins, which give it a marbled appearance. The heat is more intense; the difficulty of movement greater; the limbs are increased in size, and the sensibility is diminished.

In the third stage are observed hardness and increase of bulk in the extremities, ulcers and blackish tuberculous scabs more extended, total loss of motion, sensibility almost annihilated, general weakness, leanness, and melancholy. Although the patients usually survive this disease, yet the prognosis is not less painful. It renders life insupportable, and admits of no relief when arrived at this stage.

It does not appear to be contagious, like the leprosy. None of our soldiers were affected with it; and I am of opinion that it is less endemic in hot climates; for I have seen it in different parts of Europe, with some variations. The means of cure appear to me the same as we have pointed out in the leprosy. Topical applications however should be more insisted upon, particularly caustics, cauteries, and gradual compression.

I succeeded in curing an incipient elephantiasis by these

means in a captain of thirty-eight years of age. Although circumstances have never allowed me to undertake the cure of this complaint in its advanced stages, I am of opinion, that, if it was confined to one of the feet, and resisted the treatment above mentioned, it might be removed by amputation of the limb, as in ancient scrophulous caries of the ancle joints.

SECTION VII.

On being ordered by the Commander-in-chief to Alexandria, I experienced for the second time the effects of the *samiel* wind in the Desert: four of our soldiers were dangerously affected by it, and many of the beasts perished. On returning to Cairo I addressed a circumstantial report to General Menou, then Commander-in-chief, on the state of Lazarettos, and of the hospitals, and the whole medical department of Alexandria, Rosetta, and Damietta, which I had been sent to inspect; and resumed my course of instructions.

The whole army at this moment, deprived of every necessary, enjoyed, nevertheless, good health. The itch, the gout, and many other diseases common in France, had entirely disappeared in this climate; but the free communication established with the women of the country, propagated amongst our soldiers the venereal disease, which in course of time filled our hospitals. It was difficult to stop the effects of this contagion: to deprive the soldier of the society of women, would be the cause of *ennui* and *nostalgia*. In order to avert as much as possible the progress of this affection, I proposed to the Commander-in-chief to establish an hospital for the reception of diseased prostitutes, and such as were pregnant. This was effected; and at the same time great care was taken to send all infected men

from the barracks to the hospital, which measures produced all the effect expected from them, for in a short time the patients of both sexes were restored to health.

I have remarked that the venereal disease in Egypt is rarely accompanied with very severe symptoms, and is very easy of cure; but if it be transported into Europe, particularly into the western countries, it becomes extremely obstinate, and very difficult to eradicate, which I have experienced in a great many of our soldiers. In Egypt, mercury administered internally, with tonics and diaphoretics, assisted by the vapour-bath, was found to be the most successful; mercurial frictions were very pernicious; they did not cure the disease, but produced in some violent phrensies, in others convulsions and spasms, with ptyalisms very difficult to suppress.

Many of the inhabitants likewise, afflicted with severe diseases, were received into our hospitals; but we had great difficulty in surmounting their prejudices, which made them abandon themselves to fate. Amongst these were some cases of enormous sarcocele, which I had intended to have operated upon, when the army was unexpectedly put in motion. This disease had already attacked many of our soldiers. It is very common in Egypt and in all the countries of Asia and Africa.

Of Sarcocele.

The etymology of the word *sarcocele*, and the sense which the ancient authors have attached to it, prove that this name belongs exclusively to that disease, which distends beyond measure the exterior coverings of the testicle, especially the scrotum and the *dartos*, and gives to the scrotum an extraordinary bulk and form. The great number of patients I have seen attacked with this disease in Egypt, have enabled me to ascertain its causes, true symptoms, progress and effects; and to point out the means of cure afforded by art.

My researches in this disease induce me to think that it is endemic in hot climates; at least it is rarely met with in cold ones; for the greatest number of cases seen in Europe, have come from Asia or Africa.

I shall designate under the name of *sarcocele* properly so called, that kind of tumor which shews itself in the scrotum, under the form of a fleshy mass, wide at the bottom, and suspended from the pubis by a pedicle more or less narrow. It presents on its exterior rugosities of different dimensions, separated by lines or particular sinuses, corresponding to the mucous follicles and the roots of the hairs. There are constantly found, especially if the disease is of long standing, yellowish scaly scabs, the falling off of which discover so many small ulcers of an herpetic nature, from which an ichorous serum is discharged. The tumor is indolent, hard in some parts, and softish in others. It can be compressed in various ways without producing any pain. The patient feels no other inconvenience from it than what arises from its weight, and the interruption it presents to his walking, which obliges him to use a suspensory bandage: the urine trickles down upon the tumor, on account of the distance of the urethra, without producing any excoriation.

In all the great number of cases of sarcocele which I have seen, I have always ascertained that the spermatic cord and the testicles were in their natural state, placed on the sides, and at the root of the tumor. The spermatic vessels only increase in size and in length.

It seldom happens that the testicles partake of the disease. When this complication does take place, it is accompanied by the symptoms peculiar to these organs. They do not appear to me capable of any great distension, whatever may be the nature of their disease; for in this case the health of the patient is so much altered, that he would sink under the symptoms which would take place, even before the sarcocele (properly so called) had arrived at its second degree. The affection of the testicle ought then to be principally considered, and treated accordingly.

Those who follow sedentary trades, especially weavers, tailors, &c. are most exposed to this disease. I have thought likewise, that the kind of breeches worn by the Egyptians, in which the scrotum hangs unsupported, may concur in some measure to the formation and progress of it. Amongst the internal causes of it, may be reckoned, the different humoral vices, and degenerated syphilis, a common symptom of which is, pustules on the scrotum accompanied with itching, which the Egyptians altogether neglect. I have remarked beside, that all the patients affected with sarcocele, were likewise more or less affected with elephantiasis, of which a singular instance will be given at the end of this memoir. The part first attacked is the skin of the scrotum. Its laxity and the great number of mucous follicles dispersed over its surface, and its small degree of sensibility disposes it to tumefaction. The vessels of the cellular membrane and of the skin first become distended: their elasticity is weakened; the scrotum enlarges, and at the same time increases in thickness in the same manner as the placenta. The testicle preserves its form and healthy condition, but after a short time it can only be perceived and distinguished at the posterior part of the tumor, which continues increasing progressively at all points, and particularly in the most depending part. The cellular membrane, and the external coats of the testicle grow thicker and become fleshy, the skin becomes distended and increases in thickness. It borrows also from that of the pubis, the penis, and the parietes of the abdomen and the groins, which is necessary to furnish the monstrous bulk it in the end assumes; so that the hairs of the pubis descend more or less beneath their natural situation. The extremity of the prepuce presents itself under the form of a navel in some point of the anterior surface of the tumor, most commonly in the middle of it. The urine passes out by this aperture, and trickles down, without the patient's being able to project it.

The exterior surface of this fleshy mass becomes wrinkled and scaly; it preserves but little heat; and at short distances

may be perceived small cutaneous veins, creeping between the epidermis and the skin. The sarcocele is susceptible of still greater growth. That one in the case cited in the Ephemerides of Germany weighed about two hundred pounds.* One belonging to an Egyptian peasant was reckoned to weigh about a hundred pounds. I have seen in different parts of Egypt about ten or a dozen nearly as large, and they were all of the same description.

On dissecting these tumors, they are found to be composed of a substance like bacon, very little vascular; very hard in some places, and of a softer consistence in others. The whole of this mass possesses very little sensibility, and the patient experiences no pain when it is cut. I was enabled to judge of it, by means of one which I extirpated in an incipient state at Cairo.

An old man of sixty at Cairo called me in to look at a sarcocele which he had laboured under twenty years; and which in consequence of its size had obliged him to keep his bed. The desire of getting rid of such a terrible infirmity had induced him to consult the physicians of the country, who tried various means in vain, such as the actual cautery, concentrated caustics, incisions, and the most powerful repellents. The last physician he consulted, passed a large seton through the centre of the tumor. This operation was performed without pain and without injury to the testicles. The seton was drawn out daily, and had produced an abundant serous discharge, extremely fetid and nauseous. (The patient was beside affected with elephantiasis.) The continued use of the seton had caused a small diminution of the tumor, but promised little more good than the other means employed. I proposed the amputation of it, the necessity of which was perceived by the patient himself, and I was just going to carry it into execution, when I was ordered to Alexandria, and obliged to abandon my intention.

To the causes I have enumerated may be added, bad

* 100 kilogrammes.

living, intemperance, the abuse of women, and the immoderate use of warm baths, which all classes of Egyptians indulge in to excess; residing in moist and marshy situations; the effects of climate; occasional pressure or blows more or less severe upon the scrotum, may likewise contribute to the production of this disease.

The sarcocele appears to belong exclusively to the male species, if we suppose it confined to the genital parts; nevertheless, we may consider the fleshy tumors which make their appearance in other parts of the body, especially upon the face, where the skin is subject, as much as that of the scrotum, to the impression of venereal and psoric affections, as so many sarcomatous tumors of the same nature, and dependant on the same causes. There are a great number of this sort of tumors. There exist likewise local causes which determine the formation of them to one part rather than to another; such as falls, mechanical irritation of the skin, want of cleanliness, and the application of acrid or corrosive substances. No author, that I know of, has ever mentioned such a disease happening to the genital parts of a female, although the skin which forms and covers those parts, does not differ much from that of the genitals of a man. Doubtless the periodical evacuations, and other resources which nature has provided for women, oppose the formation of these monstrous excrescences which we see in men: nevertheless, by a singular deviation of nature, the woman named *Ammeh Fatoumy*, of Grand Cairo, presented a well marked case of sarcocele on the labia, which I shall record.

All authors, who have written on sarcocele, agree in looking upon this disease as incurable, considering the little success they have met with from the use of either internal or topical remedies. Those who have proposed amputation, have either been afraid or unable to undertake it. M. Imbert Delonnes has the merit of breaking down the barrier raised by the opinion of great physicians, by boldly employing the knife upon the sarcocele of Charles Delacroix.

I had not yet heard of the success of his operation, when I performed a very similar one in Egypt on the person I have already mentioned; and I had determined to have operated on several other very bulky sarcoceles, when the army began its march.

Whilst the disease is in an incipient state, it may be simply treated by the remedies which I shall hereafter point out; but if it is in an advanced state, there is no resource but amputation, preceded however by such internal remedies as are necessary to destroy the causes of the evil.

Amongst the internal remedies, antimonial preparations, combined with mercurial substances and sudorifics in proper doses, continued for some time, and alternated with mineral acids in small doses, diluted with mucilaginous drinks, produce most excellent effects; and principally, the sulphuric acid diluted with a proper vehicle applied externally, in the form of a lotion; or a solution of the superoxigenated muriate of mercury, of the oxide of copper and muriate of ammonia; the astringent and repellent effects of which should be assisted by a gradual and uniform pressure over the whole tumor. The success of these means is apparent by the sensible dimunition of the swelling, by the retraction of the skin, and improvement of the colour of the patient. In this case the means should be continued, with such modifications as may be convenient, until the entire reduction of the tumor be effected. Incisions and caustics appear to me of no use. I found this opinion on the little success which the Spanish and English medical men obtained in one of the cases here reported. It is even probable, that these means, followed by the application of the astringent substances which I have mentioned, would produce a cancerous affection. Finally, if after the employment of these means, variously combined, during a sufficient time, the sarcocele should remain in the same condition; I do not hesitate to pronounce the operation necessary, and to establish the possibility of practising it without danger. Its necessity is perceived by the inutility of other means, and

by the certainty there is, that this disease going on increasing, although its symptoms be not very severe, yet they will make the existence of the patient painful, languishing, and miserable. It only remains for me to shew how the operation should be performed.

The blood-vessels which supply this tumor, proceed from the branches of the pudica externa, and from some of the ramifications of the pudica interna. The spermatic vessels are confined to the testicles, which ought to be spared. The hæmorrhage, which may result from this operation, is not very dangerous, as it may be easily stopped by ligatures, made immediately after the section of the arteries. The operation is long and tiresome, but hardly painful. When once the excision of the sarcocele has taken place, even supposiug the disease to be complicated with elephantiasis, as I have often observed it to be, there is no fear of its being reproduced. At all events, the use of the means pointed out against elephantiasis may be persisted in.

There are some general rules to be observed in performing this operation. We should avoid any injury to the testicles, spermatic cords, or *corpora cavernosa*. Two oblique incisions should be made, beginning at the opening of the prepuce, or that kind of navel which appears in the tumor, and which extending in a direction downwards, should pass below the testicles, along the sides of the tumor. We should then cut deeply, with a two edged knife, in this direction, dividing the parts comprised between the *corpora cavernosa* and the testicles, paying particular attention to the management of these last organs, and take away the whole portion below the line formed by these incisions. If there still remain any sarcomatous portions round the p nis or testicles, they should be dissected off, and extirpated throughout their whole extent. The *corpora cavernosa* and testicles thus laid bare, must be covered with the integuments spared by the scalpel; and in consequence of the extensibility of the skin in these parts, we shall be able to approximate the edges together, and keep them in contact

by means of adhesive plasters and a proper bandage. The parts will readily approach and cicatrize. If any hæmorrhage should supervene, the vessels must be secured by ligature; or if they are not perceptible, the actual cautery should be employed. The success of this operation may be greatly assisted by internal remedies.

Case 1.

James Molini Qobte, cook of the convent of Capuchins of Grand Cairo, consulted me for a considerable tumor of the scrotum, which he had borne many years. It was of a pyramidal form, and weighed about thirty *kilogrammes* (sixty pounds). The right testicle was sound, and answered to the superior part of the tumor; the penis had almost entirely disappeared; the left testicle was confounded with the mass of flesh forming the sarcocele; it was not possible to distinguish its position. I still doubted much whether it formed part of the tumor, seeing that the patient had felt no pain.

This tumor was formed of a fleshy substance, almost cartilaginous in some places. In the midst of this mass we found the testicle reduced to a smaller bulk. The dressing of the wound was simple, and the cure was not interrupted by any accident. At my departure for Alexandria, I left the patient in a fair way of recovery.

Case 2.

I was waiting for the opportunity of operating upon the Egyptian, who had come down from Upper Egypt, in order to allow a drawing of his sarcocele, of which I was desirous of preserving the form and size. My project being prevented, I was determined not to quit Egypt without carrying away a rough sketch of this enormous tumor.

This Mussulman who was about sixty years of age, and blind, bore on his lower extremities a well marked elephantiasis: the feet were of a monstrous bulk; and the legs, when measured, were found half as big again as the thighs. The skin near the superior part of the leg was glossy, marbled, and traversed here and there by tortuous veins. The lower part of the leg was covered by yellowish crusts, thick, wrinkled, disposed in scales, and separated at intervals by deep ulcerated furrows, from which flowed a fetid ichor. Pressure made upon the points most swelled, caused no pain, and left no sensible impression. The skin and cellular substance presented a resistance equal to cartilage.

This man had lost his sight by the endemic ophthalmia; his skin was discoloured; his constitution debilitated; and he was leading a miserable existence.

This tumor was not weighed, but I should think it by comparison to have exceeded fifty *kilogrammes* (100 pounds). It was of an oval form; and had dispersed over its lower part rough tubercles, yellow crusts, furrows, and sinuses. It was hard, shining at some points, softish in others, without fluctuation, and of a darkish brown colour over its whole surface. About the middle of its anterior part, an oblong opening was perceived, surrounded by a thick callous edge, formed by the prepuce. This opening led to the urinary canal, which took a direction upwards and backwards towards the pubis. The *corpora cavernosa* were felt anteriorly in the centre of the pedicle of the tumor, and the testicles on the sides and in the back part: these last appeared uninjured. The spermatic cords were elongated, of a considerable bulk, and the arteries, the pulsations of which were extremely sensible, appeared to have increased in diameter. The skin of the abdomen was greatly elongated in order to contribute to the extension of the tumor, in such manner, that the hairs of the pubis had sunk considerably below that region, and the umbilicus was approached very near to it.

This mass, supported by a suspensory bandage, was the occasion of no other uneasiness to the patient than what arose from its weight, in hindering his progressive movements.

Case 3.

A husbandman, of Upper Egypt, had borne for twelve or fifteen years a sarcocele which continued increasing in bulk. At the time I met him at Cairo, the tumor was prodigious, and weighed about fifty *kilogrammes*: it descended between the legs, and forced them asunder; it was of a round shape, of a deep brown colour, unequal over the greatest part of its surface, and scattered over with herpetic scabs. The prepuce corresponded with the centre of the tumor, and the testicles occupied the sides and superior portion.

After having undergone various kinds of treatment from the physicians of Egypt, he addressed himself to an English physician who was travelling in Egypt. With the hope of a perfect cure, he submitted to the actual cautery; but the repeated application of this remedy produced no effect, and the tumor continued in the same state. Some years afterwards he consulted a Spanish physician, likewise a traveller, who pushed a trochar deep into the tumor, being persuaded that it was a case of hydro-sarcocele; but nothing issued from it except a very small quantity of blood; and the sarcocele, far from yielding to these methods, continued to increase.

These two operations, according to the patient's own account, were performed without pain; or at all events he felt very little, and no sinister accident occurred from them. The cicatrices were still perceptible, and he was disposed to submit to the amputation of it, which I had advised. I was however prevented from performing it by the same cause as in the other cases.

Case 4.

A woman named Ammeh Fatoumy, about thirty years of age, the wife of a fellâh of Cairo, was received into the civil hospital for the treatment of two enormous tumors, with which she had been afflicted many years.

These tumors were situated by the side of each other, on the verge of the *vulva;* they were contiguous before, and but little separated posteriorly. They appeared to have arisen first in the great labia; for no vestige of these could be found, nor yet of the *nymphæ.* They were nearly of the same size; each of them resembled a child's head. They were wrinkled, unequal in three quarters of their circumference, smooth, and of a reddish violet colour within; their base covered with pustulous scabs, from which a disagreeable and fetid discharge was oozing. These tumors were suspended by very small pedicles or roots from the pubis. They were hard, insensible, and, as it were, schirrous; each of them was thirteen inches in circumference, four inches six lines in diameter, and seven inches deep. This woman, who was of a sickly constitution, had an incipient elephantiasis in the feet; her lips were thick, and of a leaden colour; her gums pale and ulcerated; her face deprived of colour; her appetite depraved; and she was much given to melancholy; added to which, the digestive functions were depraved. I attributed the formation of the sarcocele to the elephantiasis with which she was affected. (It ought to be observed, that this woman had never menstruated.)

Having determined on the extirpation of these tumors, I began by preparing the patient by the exhibition of those medicines which I had found useful in elephantiasis. After six weeks of this treatment, the feet, legs, and lips were returned to their natural state; the tumors were a little softened; the discharge from the pustules was diminished, and lost its fetid odour; in short, I considered the woman,

who had now gained a little flesh, to be in a proper condition to undergo the operation.

The operation had been determined on in a clinical consultation, and the next day fixed for its performance, when the marching of the army obliged me to abandon it.

SECTION VIII.

The degree of peace and tranquillity which we now enjoyed, enabled me to collect and arrange the surgical observations I had made since the commencement of the campaign. These observations are remarkable for the peculiar phenomena which some of the wounds presented, and for the fortunate termination of most of them, as well as the influence of the climate of Egypt and Syria upon them.

In order to describe these more methodically, I shall pass over in order the wounds of the head, of the face, throat, breast, abdomen, pelvis, and extremities.

Surgery.

The gun-shot wounds received by our troops in Syria, on the upper extremities, which were complicated with fracture, especially of the humerus, although methodically and carefully dressed, have almost all been followed with preternatural articulations. The two fragments of the broken bone remained moveable, because the continual friction wore down their asperities and angles. The extremities of these broken bones became rounded, and covered with a cartilaginous substance, which facilitated their motions, which motions the patients executed in different ways, in a very imperfect manner, though without pain.

We have sent several invalids to France in this situation. The causes of this preternatural articulation I attribute—

1st, To the continual movements to which the wounded men were exposed, from the time of their departure from Syria, till they arrived in Egypt; having been obliged to perform the passage on foot, or on beasts of burden.

2d, To the bad quality of their food, and the brackish water which they were obliged to use during this fatiguing journey.

3d, To the quality of the Syrian atmosphere, which is almost entirely deprived of vital air, and over-loaded with pernicious gases, proceeding from numberless marshes, near to which we were a long time stationed.

All these causes may have prevented the formation of the *callus*. Retaining bandages, alkaline and aromatic embrocations, rest, and diet, produced no good effect.

It has likewise happened in this campaign, that very slight wounds in the shoulder, even without injury of the bones, have been followed, in almost all instances, with paralysis more or less complete of the wounded limb; which hardly ever is the case in Europe, at least if the principal nerves are not injured.

On our return to Egypt, where the air is more pure than in Syria, I have succeeded in re-establishing the sense and motion of these paralysed limbs in several instances by the moxa, more or less frequently applied, followed by the immediate application of ammonia, in order to prevent inflammation and suppuration of the parts. The use of thermal waters, and the climate of Egypt, have completed the cure in some of those where the moxa was not sufficient.

But if the wounds received by our troops in Syria and in Egypt during the season of the *khamsyn*, have been thwarted in their progress by many unforeseen misfortunes, the greatest part of which were induced by the influence of the atmosphere during that season; on the other hand, we

shall shew with what promptitude the solutions of continuity were cured in Egypt during the season of the north winds.

The whole of Egypt at this season enjoys a pure and serene sky; the burning, but uniform heat of the day is constantly cooled by the winds, which rise with the sun, and die away with him. To these salutary influences we may add, beside the assistance of science, the quality of a particular kind of lint which we employed;* the good order of the hospitals; their healthy situation, and excellent diet.

This concourse of circumstances may serve to explain, how the wounds of amputated limbs became cicatrized before the thirtieth day; the operation for the stone, in adult subjects, in fifteen days: how the trepan applied upon a great number of wounded men, has been followed by the most complete success: in fine, how serious wounds of the thorax and of the abdomen, with others of the extremities where there was great loss of substance, have been cured so readily, and without any accident. I shall mention some of the most important cases.

Most writers have forbidden the application of the trepan upon the frontal sinuses, on account of their indeterminate depth, and of accidents resulting from their perforation. I have departed from this rule in two cases of fracture of both the tables of these sinuses. The trepan was applied without difficulty, and the operation followed by success.

François Berrard, in the third assault on St. Jean D'Acre, received a gun-shot wound on the right frontal sinus. The ball, in fracturing the external table of the sinus, was cut in two pieces; one passed over the forehead, grazing the skin for about an inch; the other passed into the sinus, and fractured its inner table. This accident was followed with loss of sense, and slight symptoms of concussion.

The external fracture was of small extent, and it was not

* *Virgin lint*, made with new linen, beaten and washed.

easy to conceive that it had admitted the passage of half a ball. The fragments were not at all displaced; and I was obliged to apply one saw of the trepan upon the sinus; by which means I came to discover the extraneous body, and a fracture of the internal table of that cavity. I extracted the piece of lead easily with the elevator, and the opening made by the trepan allowed me to apply a small conical saw, by which means I perforated the lower table of the bone. There was a little extravasated blood between the cranium and the dura mater, which was evacuated by the opening made by the trepan. The symptoms were appeased, and in a few days totally disappeared. The edges of the aperture exfoliated in the end: the openings were filled up by a membranous substance; and the cicatrix of the exterior integuments was formed without any sinus.

Another case very similar happened in the same action, which likewise terminated prosperously.

I have likewise applied the trepan upon the course of the *spheno spinalis* artery, at the inferior and anterior angle of the parietal bone. The artery was ruptured; but I almost instantly stopped the bleeding by the application of a probe of iron made red hot; and the patient recovered, as did many other similar cases, who were trepanned with equal success. One of these cases was very remarkable.

A soldier of the 18th demi-brigade received a gun-shot wound at the first insurrection of Cairo. The ball after having pierced the frontal bone near its centre, and not far from the sinus, took an oblique direction backwards between the cranium and the dura mater, and continued its course along the longitudinal sinus, as far as the occipital suture, where it stopped. Its presence produced all the symptoms of compression, without pointing out the situation of the extraneous body. The patient however always referred the pain to the opposite side to that by which the ball entered; which, with all the other symptoms, left no doubt as to the situation of the ball in the interior of the cranium.

I introduced a bougie of elastic gum into the opening of

the frontal bone, and passed it without difficulty along the whole course of the passage to the ball itself, which I ascertained by its resistance and its inequalities. I measured externally the direction it had taken, by the assistance of my instrument, and then decided on laying open the point of the cranium corresponding to the extraneous body. I made a large counter-opening by means of the trepan, from which a great quantity of purulent matter was discharged. It was then easy for me to lay hold of and extract the ball, which was compressing the dura mater and the brain. The patient recovered without accident.

This operation proves, contrary to the general opinion of writers, that the search after extraneous bodies introduced into the cranium, is not always useless and dangerous, when conducted with proper caution.

We have witnessed gun-shot wounds of the face, with almost total destruction of the two jaws, cured without the patient's being deprived of the use of speech, or the power of swallowing or even masticating.

Louis Vauté, corporal of the 88th demi-brigade, received a gun-shot wound during the siege of Alexandria, in the face, which carried away almost the whole of the lower jaw, and three-fourths of the upper; in such a manner that a most frightful wound resulted from it, with loss of substance made at the expense of the destruction of the jaw, from the second right molaris to its articulation with the temporal bone. The two maxillary bones completely, the *os nasi*, the *os ethmoides*, and all the osseous portions of the nasal foramina, the *os malæ* of the right side, and the *zizoma*, were all crushed; the eye of the same side demolished; the soft parts corresponding to these osseous portions destroyed; the tongue divided through half its thickness near the middle; in fine, the fauces and posterior part of the nostrils were laid bare: large portions of the integuments and of the muscles of the left cheek and neck torn up, had left exposed the jugular vessels and the *fossa articularis* of the temporal bone. Such was the condition of this enormous

and horrible wound, when I saw the unfortunate patient in a corner of one of our hospitals at Alexandria, where his comrades had laid him down under the full persuasion that he was dead. In fact, his pulse was scarcely perceptible; his body was cold, and without appearance of life.

I, nevertheless administered to him all the relief which was in my power. As he had taken nothing for two days, my first care was to make him swallow, by means of a tube passed into the œsophagus, two cups of broth, and a little wine. His strength began to revive; he contrived to sit up of himself, and testified the most lively signs of gratitude. I washed the wound, and removed all extraneous bodies, cutting away all the soft parts that were crushed and disorganized; I tied up all the vessels I had divided; and, in fine, after washing the torn portions, I brought them together, and placed them as exactly as possible in their situations, retaining them in their position by sutures at different points. I likewise united in the same manner the two portions of the tongue which had been cut. I then covered the wound with linen dipt in hot wine, some fine lint, and a retentive bandage.

Although I had no reason to hope for the cure of this patient, I continued my attentions to him. He was made to swallow every three hours a little broth, and a few spoonfuls of good wine, by means of the elastic gum-tube to which a funnel was fitted. The dressings were frequently renewed on account of the considerable evacuation of saliva and other fluids.

This treatment was productive of the happiest effects; the patient continued to grow better and better; suppuration took place, and of a healthy appearance; the sloughs came away; the edges of this enormous wound approached each other; the adhesion of the parts that had been brought together took place readily, and this soldier was in a condition to return to France at the time of our evacuation. The whole of the cicatrization was completed in the end.

After having been supported the first fortnight by means of the tube, the patient was able to take a little soup out of a vessel with a spout, and at length from a spoon. He went on in this manner improving, until his health and jolly appearance were perfectly restored.

This respectable soldier, who may be seen at this day in the Imperial Hospital of Invalids, speaks well enough to be understood, especially when this large and broad aperture is covered with a mask of silver.

The wounds accompanied with the loss of substance from the soft parts of the mouth, were cured here almost without deformity by the assistance of sutures immediately applied.

M. * * * *, aid-de-camp to General Verdier, received a wound in the mouth by a pistol, which carried away the whole of the left cheek, from the opening of the lips, to the masseter muscle, in such a manner that the two rows of teeth, the tongue, and a part of this muscle were laid bare. The edges of the wound were turned up and blackish, and the patient experienced already sharp pains. I lost no time in washing the lacerated parts, and regulating them in such manner as to bring their edges in contact, in which state I retained them by nine points of suture, supported by a proper bandage. The patient was placed on low diet, with the use of cooling medicines, which prevented the fever and other accidents. The cure was effected in seventeen days, and very little deformity remained. A similar case occurred to me in the army of the Rhine.

The following case will likewise be found very curious: A grenadier, named Fournier, retained during six weeks a fragment of a bayonet, of nearly three inches, in his throat on the left side, under the pillars of the *velum palati*. The presence of this extraneous body, which had been in vain attempted to be extracted, had produced the almost total loss of speech. I felt this body at the bottom of the fauces, and by the operation of pharyngotomy, cut down upon the substance enveloping it; when laying open the fragment, I

accomplished the extraction of it, which was followed by the immediate recovery of speech. This grenadier was cured in the course of a few days.

Michel, a private of the 32d demi-brigade, received a gun-shot wound on the 21st of March, 1801. The ball entered by the angle of the jaw, traversed obliquely the throat, and passed out at the jugular region of the opposite side. The base of the tongue was furrowed, and the epiglottis carried away. The patient spit it up after the accident, and shewed it to the surgeon who first saw him: the truth of this fact will appear from a narration of the symptoms.

The patient suffered little; but his voice could with great difficulty be heard, and in a hoarse and very feeble manner. When he attempted to swallow for the first time, he fell into a convulsive fit of coughing, threatening suffocation, and accompanied with vomiting. Being tormented by the thirst, which the extreme heat of the season, and the irritation of the wound produced, he incessantly renewed his attempts, and always with the same results. He passed four days in this miserable condition. He already experienced violent uneasiness of the stomach; continual watchfulness; the pulse small and accelerated, and the emaciation began to be very visible.

Such was the state of the patient when I saw him on the fifth day. After questioning him on the circumstances that had occurred since the accident, trying to make him drink, and examining the interior of the mouth, I became convinced that the cause of his suffocations depended upon the permanent opening of the glottis, the covering of which had been carried away by the ball; an accident certainly very singular, and which I believe to be unique. The prognosis of this wound was unfavourable; and there is no doubt, had the patient been left to the sole resources of nature, but he had perished in the course of a few days. The indications were not difficult to attend to: the most urgent was to appease the hunger and thirst of this honourable victim;

and it is all that art could attempt in such a case. I was fortunately provided with a tube of elastic gum for introducing into the œsophagus, by the aid of which carefully introduced, I sent into the stomach of the patient, first, a small quantity of cooling drink, and afterwards some excellent broth.

I repeated this operation before the surgeon in attendance, who took care to repeat it as often as circumstances should require. I watched carefully the progress of this wound, and had occasion to convince myself of what M. Desault has remarked, that the sensibility of the mucous membrane of the larynx is relative. Thus the sligthest drop of any liquor whatever introduced into the larynx, provoked in an instant all the symptoms we have described, whilst the introduction of the tube into this organ incommoded it no longer than while the instrument is engaged in the pharynx; and by reason of this analogy of impression some blunders were made at first: there was no being assured that the tube had passed into the larynx and not into the pharynx, but that the first drops of liquid that fell upon it, caused the patient hastily to push away the hand from which he expected relief, being seized with a suffocating cough, which sometimes put him in the greatest danger.

The passage of the air, as pointed out by authors, is not a certain sign of the tube being in the larynx, for it was found to pass the same when it was evidently engaged in the œsophagus.

In order to avoid this inconvenience, I directed the tube horizontally backwards till it touched the back part of the fauces, and pushed it gently on in that direction, obliging it to curve itself slightly, in order to enter into the pharynx; and, that I might not be mistaken, I began always with passing a very few drops of liquid at a time, the deglutition of which assured me of the easy passage of the rest. In the contrary case, I changed again the direction of the tube until success was obtained, which became certain when

I conducted it into the throat by the assistance of the finger.

This plan, persisted in for a long time, saved the life of this soldier: the wound became clean, furnished very little discharge, and cicatrized readily; but the difficulty of swallowing continued always, and his speech was only restored after a considerable lapse of time, and then in a very imperfect manner. At the end of about six weeks he was able to swallow without any conductor, a small quantity of thick panada: the first efforts at deglutition were extremely painful, but they became easier in the end; and on his return to France he was able to swallow rice made very thick, which he prepared in the form of bullets. It appears that these kind of aliments cleared the glottis, which they constantly encountered, only because they were of a consistence sufficiently solid, and presented a sufficient bulk to slip over its edges without being able to enter it. In placing this soldier among the invalids, I gave him an express certificate, that he might receive the kind of aliment necessary for his situation. The functions of speech and deglutition were in the end perfected, without doubt, because the *aritænoid* cartilages have in part supplied the place of the epiglottis, from their developement and expansion.

General Murat was wounded at the battle of Aboukir, in 1799, at the moment of obtaining the victory. A ball passed through his throat, from the right angle of the jaw to the left side of the neck, near the superior insertion of the *sterno-cleido-mastoideus* muscle. This shot, after having cut through a portion of the *masseter* muscle, and the branches of the facial nerve, entered into the mouth, directing its course obliquely downwards and backwards, it probably injured the ninth pair of nerves, passed in front of the jugular vessels, and made its way out at the point already indicated.

Deglutition was at first extremely difficult; the voice was hoarse and interrupted. I dressed him on the field of

battle, and continued my attendance upon him till our departure for Cairo. His wounds were then in a very fair way of recovery.

Pierre Soult, of the 22d chasseurs, received from a Mameluke at the battle of Sâlehyeh, a blow from a sabre, which, after having cut through the skin and external protuberance of the occipital bone, divided the extensor muscles of the head down to the sixth cervical vertebra, the spinous process of which was cut off. There resulted from this wound an enormous flap, which fell down over the shoulder, and the chin was found resting upon the breast. I succeeded in uniting this immense wound by means of several sutures and a uniting bandage. The patient returned a short time after to his corps perfectly cured. I have since had occasion to see this man in France, who assured me, that he had ever since been deprived of the generative faculty.

The wounds of the chest have also presented singular phenomena, which have given me occasion to make some additions or corrections to the usual modes of treatment.

The great number of soldiers that I have seen die from hæmorrhage, in consequence of wounds penetrating into the chest, with injury of the lungs, induced me in a case of this nature which occurred to a soldier who was brought into the hospital a few moments after receiving the wound, to attempt a method suggested at the time by the desperate case of the patient.

The wound of this soldier, which was inflicted by some cutting weapon, penetrated the breast between the fifth and sixth rib, the direction of which it followed: it was about eight *centimetres* in length. At every inspiration a great quantity of vermilion and frothy blood, accompanied with a hissing noise, gushed out. The extremities were cold; the pulse hardly perceptible; the countenance pale; the breathing short and laborious; in short, the patient was threatened every instant with a fatal suffocation.

After examining the wound, and assuring myself the

divided parts were parallel to each other, I immediately brought together the two lips of the wound, and fixed them in contact by means of adhesive plasters, and a suitable bandage.

In this mode of proceeding, I had no other object in view, than to conceal from the eyes of the patient and his companions the afflicting spectacle of a hæmorrhage, which was about to pour out the life, together with the blood, of this unfortunate man. I considered beside, that the effusion of the blood into the cavity of the chest could not increase the danger.

But scarcely was the wound closed, than the patient began to breathe more freely, and felt himself relieved. In a short time the heat returned, and the pulse began to be felt. In a few hours the calm was complete; and to my great surprise the patient continued to grow better and better. The cure was completed in a very few days, and without any obstacle. Two cases precisely similar have presented themselves at the hospital of the Imperial Guard.

From the time of Ambroise Parèe, to the present, all practitioners and authors who have written on wounds of the chest, have recommended that these penetrating wounds should not be closed, especially when accompanied with hæmorrhage. They advise on the contrary that the bleeding should be facilitated by a proper position of the patient; by enlarging the wound; by the introduction of a canula, &c. Nevertheless, the ancients were in the habit of closing them; and some of them even employed the suture to render the contact more exact. Ambroise Parèe himself gives an example of a cure obtained by this method.

The astonishing success I obtained in these three desperate cases, inclines me to think that this method is preferable to that in common use, which generally presents to nature obstacles very difficult to be overcome, and sometimes impossible.

We have likewise met with singular wounds of the abdomen, of which I shall next speak.

Pierre Bayard, corporal of the 18th demi-brigade, was in the habit of sustaining periodically the loss of a quantity of blood from the navel. These hæmorrhages were preceded by symptoms of turgescence, and followed by a return of his ordinary state of health: the navel then appeared in its natural state, without any solution of continuity. On the approach of this discharge of blood the umbilical tubercle swelled; appeared of a purplish colour; opened; and at length poured out a quantity of black oily blood, which was in the habit of oozing out twice in the twenty-four hours. The abdomen of this patient was always tumid; his liver hard, and bloated. There is not a doubt but this flow of blood proceeded from the umbilical vein, the cavity of which was preserved, which is a very rare occurrence: it is on this account that the case of this man is so curious.

We have had some instances of the complete cure of wounds of the abdomen, complicated with injuries of the intestines and of the bladder. I shall report some of the most remarkable.

M. N****, at the storming of Cairo, received a shot in the abdomen, which cut through the muscular parietes of this cavity on the right side, together with a portion of the intestinum ileon. As I happened to be on the field of battle, I administered to him the first attendance. The two ends of the intestine were protruded at some distance from each other, and inflated: the superior extremity was reflected upon itself in such a manner, that its edge being constricted, like the prepuce in paraphymosis, strangulated the intestinal tube: the course of the fœcal matter was intercepted, and it accumulated above the constriction.

Although this patient was in a hopeless state, both on account of the nature of his wound, and of the degree of weakness and of cholera morbus to which he was already reduced, since the time that he had been left without assistance in an entrenchment, I did not hesitate to attempt the relief of so singular an accident.

I began by making four small incisions with a pair of

scissars on the neck of the strangulated intestine, which I returned into its proper situation; I then passed a ligature through the part of the mesentery corresponding to the two ends of the intestine, and returned them as far as the edge of the opening, which I had taken the precaution to dilate, and, having applied the dressings, awaited patiently the result. The first few days were inauspicious; the alarming symptoms however afterwards disappeared; those which depended on the loss of alimentary matter, went off one after another; and after two months of care and attention, the two ends of the ileon were in contact, and ready to form an adhesion. I seconded the operation of nature, and dressed the patient after the manner of M. Desault, that is to say, with the plug, which was employed during two months. This soldier went out of the hospital perfectly cured.

The great arch of the colon has been wounded in several instances, and the wounds have been healed without leaving any passage externally for the excrements. The siege of Acre furnished us three cases, and that of Cairo two. I took care to dilate well the external wounds. I ordered for the patients the frequent use of clysters of decoction of linseed, and of mucilaginous drinks; at the same time they were made to observe a rigorous low diet, and the utmost repose.

The wounds of the bladder have generally terminated equally fortunately. The most remarkable instance is that of François Chaumette, wounded in the battle of Tabor. The ball passed through the pelvis, at a finger's breath from the pubis, at that point of the left hip which answers to the sciatic niche. The direction of the wound, and the discharge of urine and fœces, convinced me that the bladder and rectum were injured. M. Milioz, who was charged with the cure, followed carefully the method he had seen me put in practice at the siege of Acre. When the suppuration was established, the patient experienced a degree

of fever. On the falling off of the sloughs, the discharges were abundant. The catheter introduced into the bladder, prevented the dripping of the urine, and thus facilitated the adhesion of the lips of the wound of this viscus, which was the first healed. This patient was perfectly recovered on his return to Cairo.

A fusileer, named Desjardins, was wounded in a sortie of the garrison of Acre, by a ball which passed through the pelvis from the left sciatic niche to the right side of the scrotum, where it stopped. The bladder was wounded in two opposite points, and the urine passed through into the scrotum, which swelled prodigiously, and became gangrenous. The surgeon, who had the care of him, dilated the wound through which the ball entered, and made an incision into the scrotum, where it had stopped. On the following days it was necessary to make deep scarifications on these parts, in order to arrest the progress of the gangrene, and assist the operation of nature in throwing off the sloughs. In the mean time care was taken to introduce an elastic catheter into the bladder, which prevented a fresh deposition of urine into the scrotum. After fifteen days of severe suffering, the cure became certain. The sloughs fell off, the posterior wound closed rapidly, but those of the scrotum remained a long time without cicatrizing. On our return from Egypt, there still remained a fistula through which the urine flowed, of which however he was cured a short time after.

Several other similar cases presented themselves in the different engagements which took place afterwards, and all the cases were cured by the same course of proceeding. General Bon is the only one who died from this kind of wound, because he would not allow the openings to be dilated, nor the introduction of a catheter into the bladder. The effusion of the urine produced in a short time gangrene, the progress of which was much forwarded by the corpulency of the patient.

I shall trace out succinctly the consequences resulting from these kinds of wounds, and the treatment necessary to be pursued.

In the first twenty-four hours, but little urine escapes from gun-shot wounds of the bladder, on account of the tumefaction which takes place almost instantaneously in the lips of the wound. When the bladder is full, it flows out only at the moment of the wound, and from that wound only through which the ball passes out. Its escape is afterwards prevented by the slough which fills up the whole course of the wound; and it is only after the falling off of this slough that the draining of the urine beg[illegible]. It is then of the greatest importance, that there should be in the bladder, and for a continuance, an elastic gum catheter, sufficiently large to fill entirely the urinary canal; for, if at the moment that the sloughs become detached, the urine not having a free passage out, passes through the wounds, and insinuates itself with so much the more facility, as the detachment of the sloughs furnishes an infinity of pores of absorption, especially in the cellular membrane, which is laid bare: hence proceed gangrenous affections, and death, as in the case of General Bon.

After freely laying open the wound, in order to facilitate the passing out of the urine, which may be detained in the course of the ball, a large elastic catheter should be introduced, which should be left in the bladder, taking care to renew it every two or three days, to avoid incrustations. Emollient clysters should be prescribed; mucilaginous acidulated drinks should be given; and a rigid low diet observed by the patient, with strict repose. The dressings should be simple; and great attention should be paid to cleanliness.

It now remains for me to speak of wounds inflicted on the limbs, and of the manner in which I have conducted their cure.

Amongst the gun-shot wounds on the superior part of the arm, with complication of fracture and loss of substance;

among those of the lower part of the arm or forearm with sphacelus, nineteen have occurred which required amputation at the shoulder joint. This operation was attended with complete success in thirteen of these wounded men; the other six died of plague, or of the effects of commotion caused by the wound on the internal organs.

The nature of these wounds has required a variety in the mode of proceeding, it not being possible to employ one uniform method in all the cases requiring this operation. In some the wound passed through the superior extremity of the arm, with fracture of the bone and disorganization of the soft parts: in this case the mode of proceeding of Lafaye appears to me the most suitable; in fact, it would have been impossible to have formed the posterior and anterior flap according to my method, since they would have been destroyed by the wound. On the contrary, Lafaye's method would be impracticable where the deltoid muscle was destroyed by the wound.

General Fugieres furnished an example of this latter kind. The ball had struck the shoulder transversely from before backwards; the integuments, the deltoid muscle, and a portion of the *acromion* were carried away; the head of the humerus crushed; the axillary artery, some branches of the nerves, and the tendons surrounding the articulation were torn, in such manner that the arm, already cold, hung only by a part of the integuments of the axilla, and the tendons of the great dorsal, and *teres major* muscles. Such was the situation of the wound when the General was brought to the central *ambulance*, in the rear of the line of battle. The commotion produced by the ball, and the quantity of blood lost at the instant of the wound, placed him in a situation of extreme danger: his countenance had lost its colour, his pulse was scarcely perceptible, and he was experiencing such agonies as made me fear his dissolution was at hand.

I could see no safety but in the immediate amputation of the arm. I formed two flaps; one posterior of the great dorsal, teres major muscles, and the skin; the other shorter

and smaller in the fore-part, formed at the expense of a portion of the pectoral muscle which had escaped the ball, and of the neighbouring teguments. The artery was already retracted under the pectoral muscles, but continued nevertheless to pour out blood in more or less quantity, according to the exertions of the patient, in such manner that I was under the necessity of cutting these muscles to discover it, and tie it up, very near to the clavicle. The wound which resulted from this operation was enormous; I brought it together as well as it was possible; but one part of its edges was afterwards destroyed by gangrene, the consequence of severe contusion.

Two days after the action I accompanied the patient to Alexandria, and continued my attendance upon him until the detachment of the sloughs, and the entire cessation of the first symptoms took place. At this period I closed again the lips of the wound, by the assistance of a uniting bandage, which acted only upon its circumference. This method proved favourable to the cicatrization; and the cure was effected two months afterwards. The cicatrization however was not effected without a great extension of the integuments, and their adhesion to the cavity of the scapula. For which reason the General felt shooting pains in the stump, with disagreeable prickings, which I attribute to the distension of the nervous filaments, and to the interruption of the circulation in the cicatrix.

Three other wounds received at the siege of Acre, and during the blockade of Alexandria, presented nearly the same phenomena, and were likewise happily cured. In some other cases the destruction of parts being confined to those below the articulation of the humerus, so as to leave sufficient integuments for forming the anterior and posterior flaps, I employed the method of Desault, with this difference however, that instead of beginning with the anterior flap, I began with the posterior. The head of the humerus is indeed more difficult to dislocate outwards; but the hæmorrhages which sometimes occur on beginning by

the anterior flap, and which are not easily stopped or prevented, are avoided. These hæmorrhages are most to be feared where there are no medical assistants, as often happens in the armies, otherwise the method of Desault is to be preferred.

The following is my mode of proceeding. After having formed the posterior flap, I make the incision of the capsular ligament of the joint from behind forward, directing the arm forward, and towards the body. I afterwards grasp with one hand the part intended to form the anterior flap, particularly the axillary artery, in order to prevent the effusion of blood: I then introduce the knife behind the head of the bone, and finish this last flap, directing always the blade of the knife by the side of the humerus, so as not to cut the artery too high up, and to leave it of a sufficient length to admit easily of the ligature. A number of our wounded were operated upon in this manner. The cicatrization was promptly effected, and the cure completed before the thirtieth day.

It is not always necessary to amputate at the joint whenever the upper part of the humerus may be fractured. If the injury is confined to the bone, and the principal muscles, tendons, and large vessels are not destroyed, it will be sufficient to remove the extraneous bodies. I am not ignorant that this kind of injury has been reckoned by authors amongst those which demand extirpation of the limb; but I thought proper to deviate from their precepts in the case of a wounded man at the taking of Spires, in 1792. The head of the humerus had been crushed by a ball, while the soft parts had scarcely received any injury, although the ball had passed quite through the shoulder. After dilating the openings, I extracted the head of the bone by piecemeal; the patient was cured, and the arm retained an anchylosis.

The extirpation of the head of the humerus has been recommended by some authors of note, with the view of avoiding the amputation of the arm. Mr. Park was the

first who practised it in England; it was afterwards effected by Mr. White, his countryman, and by M. Vigaroux, at Montpellier.

M. Subatiere has paid great attention to the removal of the head of the humerus, and has made known in a memoir presented to the Institute of Paris the mode of operation which he at length decided upon.

The cases which would render the extraction of the head of the humerus necessary, ought frequently to occur; nevertheless we have only two well attested cases of this operation. The first is that of Boucher, who extracted several bony fragments of the articulation of the humerus, and even of the scapula. The second instance is furnished by a surgeon of Pezenas, named Thomas. The operation was performed upon a little girl of four years of age, on account of an abscess complicated with caries, the consequence of the small-pox. Nature had already commenced the operation, by expelling through the abscess a portion of the body of the humerus deprived of its periosteum: the separation of the osseous piece was effected spontaneously, and there only remained for the surgeon to extract the head of the bone, which being as yet but an *epiphysis*, had not followed the portion of the body of the humerus. The success of the operation was complete. It must be remarked, that the extraction by fragments has only been attempted in chronic affections, such as a deep caries of the humerus, and scrophulous exostoses. It is my intention to prove that this operation becomes immediately necessary in gun-shot wounds which have crushed the head of the humerus, and to point out the method which appears to me the most simple, and which has succeeded in my hands.

It sometimes happens that a ball sent from a short distance strikes the humerus below its head, and fractures the bone cleanly. The whole extent of the mischief is not at first perceived; only two small openings are seen, whilst the shoulder preserves its conformation, because the head

of the bone remains untouched, or at least its fragments are in close contact, and it continues to fill up the glenoid cavity. The mischief however may be ascertained by introducing the finger into each of the two openings, when the cavity between the two portions of the bone will be distinctly felt, being considerable, on account of the sinking of the lower portion.

In this case it will be useless to dilate the openings, since they cannot be sufficiently dilated to admit of easily laying hold of the head of the bone and extracting it. The presence however of this protuberance, which is now become an extraneous body, maintaining no longer its proper direction, and contact with the body of the humerus serves only to irritate the parts and inflame the joint. In a short time collections of matter, and deep caries of the bones make their appearance, and there is no resource left but to extirpate the arm. I have been fortunate enough to prevent these accidents, and avoid the amputation of the arm in ten different instances, by extracting altogether the head of the humerus, or its fragments, in the manner following:—

I form an incision in the centre of the *deltoid* muscle parallel to its fibres, carrying it as low down as possible; after which I separate the lips of the incision in order to expose the joint, the capsular ligament of which is most commonly ruptured, and with a blunt pointed curved bistoury I divide with the greatest ease the attachments of the tendons, of the *supra* and *infra-spinalis, teres minor, subscapularis,* and the long portion of the *biceps.* I afterwards disengage the head of the bone, and push it out through the opening in the *deltoid,* either with my fingers, or with an elevator, passed through one of the lateral wounds: I then proceed to approximate the arm towards the shoulder, fixing it in the most convenient position by means of a sling, and a proper bandage. Such is the method I have pursued in ten different patients for the extirpation of the head of the humerus. One of these ten died

of the hospital fever, and two of the scurvy at Alexandria; a fourth likewise died of the plague after his cure on our return from Syria; the rest returned into France in good health. The arm in some instances became connected with the shoulder; and in others there was formed a species of accidental articulation, which would allow of some movement.

It will be necessary, in order to second the operation of nature, to make the wounds extend to the lowest part of the injured bone, in order to prevent caries of the medullary cavity, lodgments of matter, and the formation of sinuses. It is also necessary that the dressings be frequent, and conducted with great care and gentleness; for the suppuration which ensues is generally very profuse, acrid, and ichorous; it irritates and inflames the parts. Emollients in the form of poultices or fomentations are very proper during the first days.

When exfoliation of the fractured bone has taken place, the humerus should be brought in contact with the scapula, the articular cavity of which will be now pretty well effaced. The swelling of the cartilage which takes place, disposes it very much to unite with the body of this bone, and to form between them an anchylosis. If however the exfoliation is long before it takes place, this adhesion no longer forms, but a kind of articulation is established, which diminishes the strength of the limb.

This operation ought to be performed as early as possible, as it prevents irritation of the parts, and the consequent inflammation, as well as abscesses, caries, sinuses, &c. which in the end render amputation of the arm unavoidable.

Jean Ficher, grenadier of the 60th demi-brigade, at the taking of Alexandria, received a gun-shot wound in the left arm. The ball, which entered nearly three inches from the clavicle, near the axilla, had passed through a portion of the great pectoral, and *coraco brachialis* muscles, and produced a fracture of the humerus just below its tube-

rosity, forming some splinters of that bone, the head of which remained unhurt, and attached to the scapulary tendons: it at last passed out at a point directly opposite, dividing in its passage the circumflex arteries, which furnished a considerable hæmorrhage, so that the patient felt himself greatly weakened.

Having assured myself of the nature of the injury, I laid open the two wounds to some depth; but not being able to dislocate the head of the humerus by these means, I conceived the idea of making a longitudinal incision along the deltoid muscle upon the joint. I then separated the lips of this incision, and, raising the arm, I made a circular incision of the ligaments and tendons of the joint with a probe pointed bistoury: the head of the bone was now pushed through this opening, taking care at the same time to remove all the splinters. I afterwards approximated the arm towards the shoulder, and confided the patient to the care of M. Masclet, surgeon of the first class, who completed the cure in sixty days. The fractured portion of the body of the humerus exfoliated, and the bone formed an adhesion with the scapula.

The following case is still more remarkable than this on account of the nature of the wound, and its fortunate termination.

At the battle of the pyramids, Jean Gravel, a drummer of the 32d demi-brigade, was wounded in the right shoulder at the moment he was beating the charge, by a shot of four pounds calibre, which, pursuing a parabolical direction, made the circuit of the whole shoulder from before backwards; but in its passage it likewise turned upon its axis, so that the skin, being very elastic, yielded to its impulse, and was only broken at the projection of the *acromion:* nevertheless the head of the humerus, the extremity of the clavicle, the acromion, and the coracoid process were fractured, and a great portion of the deltoid muscle was found disorganized. In spite of this destruction, I conceived the hope of saving the arm of this patient. The axillary vessels, the

nerves and tendons in the axilla were uninjured. It was easy enough for me to extract, by making some incisions, the acromion, and humeral extremity of the clavicle already detached: the extraction of the head of the humerus however was more difficult, on account of the tendons, which held it firmly fixed in the glenoid cavity. The operation nevertheless was not impeded by any accident, and this young soldier supported it courageously. A copious suppuration at length succeeded to the swelling, which was considerable, with pain and redness of the skin, fever, restlessness, &c.; the tumefaction of the parts subsided, rest and sleep returned, the fractured portion of the humerus exfoliated, as did likewise the spine of the scapula and the glenoid cavity. In a short time afterwards the wound cicatrized, the arm coalesced with the scapula, having been gradually approximated, and in the end this young man was completely cured, so as to depart for France with the convoy of invalids, whose unfortunate fate we have already mentioned.

A case very similar to the above occurred at the third assault upon St. Jean D'Acre, which terminated almost precisely in the same manner. This case and the other seven, which differ very little from those above stated, I do not consider necessary to detail.

I shall now proceed to give an account of the result of an amputation which I performed at the hip joint. I have had occasion to perform this operation three times, once, while with the army of the Rhine, and twice in Egypt. In the first case the operation was performed without accident, and the patient had passed several hours in a state of tranquillity so perfect, that the most favourable prognosis might have been drawn from it: but a forced march of a night and a day in the severest time of the winter, was most probably the cause of his death.

Before reporting the other two cases, I shall endeavour to prove the possibility of this operation, and the necessity

of performing it in some circumstances. I shall likewise point out my own method.

However cruel any operation may be, it is an act of humanity in the hands of a surgeon, when it is likely to save the life of a patient which is in danger; and the more pressing the danger, the more the relief ought to be prompt and energetic. *Ad extremos morbos, extrema remedia exquisité optima (Hippoc. Aphor. vi. Sect. 1.)* Under these circumstances, the experienced surgeon will do his duty without thinking on his reputation.

The frightful appearance of the wound; the difficulty of dislocating the thigh bone from its cavity in the *os innominatum*; the danger of the retraction of the flexor muscles; and the hæmorrhage, are without doubt the motives which have deterred army surgeons from attempting this operation, although the cases which require it must undoubtedly have occurred in their practice. To these objections it may be answered;—

1st, The extent of the wound is more terrific than dangerous. The Cæsarian operation on the living woman has been performed with success, and is recommended in the present day by a great number of practitioners. The principal surgeon of the hospital at Rouen has effected happily the extirpation of a schirrous ovarium, and of a considerable magnitude. There are examples of the arm being torn off together with the scapula in some extensive injuries, and the patients have been readily cured. Beside the surgeon would diminish the extent of the wound by more than half.

2dly, The manual difficulties, particularly that of dislocating the bone, are diminished by the proceedings I have instituted, which I submit to the judgment of my medical brethren.

3dly, The circumstance of the retraction of the muscles has been exaggerated. In those operations I have performed, it has appeared to me to be hardly any, or at least

very far from drawing these muscles to the abdominal openings. My method has likewise the advantage of preventing this inconvenience.

4thly, The dangerous effects of hæmorrhage may be prevented by the assistance of instantaneous compression employed by expert medical assistants, on the orifices of the divided vessels; and by immediate ligatures made on the vessels themselves. These ligatures stop the blood much more easily and certainly than those which comprise the flesh and cellular membrane which surrounds the artery.

As to the general oozing of blood which has been looked upon by practitioners as so dangerous after this operation, it is not to be feared. I believe I shall be very well able to demonstrate this in my memoir on amputation, which will be placed at the end of the campaign of Austerlitz.

There are three principal cases of gun-shot wounds which indicate the extirpation of the thigh at the hip-joint.

The first is, when the limb is disorganized or carried away by a shot or shell so near its superior articulation, that no room is left for the ordinary amputation.

The second case is, when a grape-shot or other large shot has broken the thigh bone at its superior extremity, near the trochanters, and torn the crural artery, or disorganized the sciatic nerve.

The third case is, when the leg and thigh, from the violent contusion of the soft parts, is threatened with sphacelus up to the hip-joint, of which I have seen several examples.

The practitioners who have proposed the extirpation of the thigh, are not all agreed with respect to the manner of accomplishing it. Almost all, however, dreading the hæmorrhage from the crural artery, begin by passing a ligature upon this vessel, and afterwards form a flap out of the posterior muscles; they then proceed to lay open the back part of the joint, open the capsular ligament, divide

the inter-articular ligament, and finish the operation by forming the internal flap.

This method is exceedingly tedious, difficult, and dangerous. The hæmorrhages resulting from the *gluteal, sciatic*, and *circumflex* arteries are very difficult to restrain while the limb is on: the bone is dislocated with the greatest difficulty, and there is great danger from the different attitudes in which the patient is obliged to be placed, of breaking the ligature upon the crural artery; or even of touching the artery with the knife, above the ligature, in spite of all the care that can be taken. There are beside other inconveniences which it would be useless to detail.

In order to operate according to my own plan, I first place the patient on the foot of his bed, nearly in a horizontal posture, and station myself within the limb to be operated upon: an active and intelligent assistant makes compression on the crural artery, where it passes out under the ligament; I then make an incision on the integuments of the groin in the course of the crural vessels, which I lay open; these I dissect with great caution, and, having isolated the nerve, which is outside, I pass a blunt crooked needle between it and the artery, in such manner as to include the artery and vein in order to tie them up together. I pay particular attention to pass this ligature immediately below the crural arch, in order to secure it above the origin of the *muscularis communis*, the division of which during the operation would cause a fatal hæmorrhage. After having made this ligature, and passed another for security, I plunge the point of my knife straight between the tendons of the muscles which are attached to the little trochanter, and to the base of the neck of the femur, in such a manner as to make the point of it pass out at the part directly opposite, on the posterior part of the thigh; then directing the knife obliquely inwards and downwards, I divide at one stroke all the parts intended to form the inner flap, which must not be made too large. The flap is then raised

up towards the genitals by an assistant, and the joint is immediately discovered. The *arteria obturatrix* and some branches of the pudica are comprised in this incision, and must be secured. One single stroke of the bistoury serves to divide the capsular ligament, and by a simple abduction of the thigh, the head of the femur is nearly dislocated. The inter-articular ligament now presents itself, and it may be imagined how easily it may be divided with the same bistoury. After this I take a small straight knife with which I form the posterior and external flap, passing its edge between the bony rim of the *acetabulum* and the great *trochanter*; I then finish the flap by a stroke carried downwards and outwards, made nearly on a level with this eminence, and in such a manner as to give to the flap a somewhat roundish form: the assistant who holds the flap, stops the orifices of the divided arteries, which should be secured in succession. Even the smallest vessel should be tied up, to prevent after hæmorrhages, and to allow the union of the flaps. If the parts which compose these are not already irritated, a few points of the interrupted suture might be made, but the muscles must not be touched: it will be sufficient to include the skin and cellular substance. The flaps should be fixed in contact by compresses gradually increased, dipped in red wine, and by a retaining bandage dexterously applied.

This method is ready, and has always to me been easy: I had formed the idea before going into the army, and the attempts made upon dead bodies and animals gave me great hopes of success.

The surgeon ought to have a particular regard to the general state of the patient after the operation. If the least sign of plethora appear, bleeding must not be neglected, with cooling antispasmodic medicines, rest, and low diet. By these means the accidents usually resulting from great operations may be prevented.

The second patient on whom I had occasion to perform this operation, was an officer of the 18th demi-brigade,

named Bonhomme, who was brought to me from the trenches of St. Jean D'Acre, with an enormous wound on the right thigh from a shell.

The muscles were lacerated or carried away throughout a great part of the circumference of the thigh: the femoral artery was torn at five or six fingers breadth from the crural arch, and the femur was found crushed as far as the great trochanter. The patient had lost a great deal of blood; was greatly weakened; I thought even, that without the immediate extirpation of the limb, he could only survive a few minutes. I consequently proceeded at once in the manner as follows.

I laid open the crural artery, and passing two ligatures over it in the manner described above, I tied the artery together with the crural vein. The internal flap and the division of capsular ligament of the joint were effected with great ease, the bone was quickly dislocated, and I finished the operation with forming the external flap.

The two flaps having been formed with great regularity, an exact union was obtained, and I could easily fix them in their situation, by the assistance of sticking plasters and a retaining bandage.

The patient passed the whole day and the following night with as much quiet as could be desired. I administered to him some antispasmodic draughts, and ordered him cooling drinks and light broths, with a small quantity of wine. The next day the dressings were soaked with a reddish serum, without swelling, pain, or tension in the stump. The night of the second day was passed quietly; the patient had three hours of good sleep; the third day I removed the upper dressings for the purpose of renewing them. He passed the day very well; the excretions were passed with ease; and the patient asked for something to eat. I allowed him some rice pottage morning and evening.

In the night between the third and fourth day of the operation, a slight degree of febrile affection shewed itself, accompanied with throbbings of the stump and general

heat, to which succeeded a profuse perspiration, with ease and sleep. At my visit next morning I found the dressings soaked through with a purulent serosity. The flaps were already united throughout half their extent; there was left on their anterior and posterior lips an opening of about five inches, where I had left the ligatures of the vessels. The wound was properly dressed, and the bandages renewed.

On the fifth day he was in the best possible condition; suppuration had already taken place in the two small openings which remained, and was of a healthy appearance. On the sixth day the situation of this officer was still more favourable, and every thing seemed to promise a perfect cure; but the inconvenient situation of the *ambulance*, and the impossibility of isolating any of the wounded men, even the most serious cases, was the cause of the unfortunate occurrence of the following night, which our unpleasant situation put it out of my power to prevent.

A soldier, who had been hatching the plague in his tent for several days, received a ball in the leg just as he was going to present himself at the camp hospital. Although he was very ill of the plague, he was placed, without my knowledge, in consequence of his last accident, in the ward of the wounded men, where laying himself down by the side of this officer, on the same bundle of straw, he imparted to him the disease, which declared itself during the night between the sixth and seventh day. The next day the stump was attacked with gangrene, the progress of which was so rapid, that death speedily put an end to the hopes I had conceived the evening before.

The subject of the last case was a young lad of about twenty years of age, a drummer in the 2d demi-brigade, who had the right thigh carried away about the middle by a piece of a shell, in the last assault on Acre: the fracture of the femur extended quite up to the joint; the muscles were crushed and disorganized. This patient, although greatly reduced by the hæmorrhage, which immediately succeeded the wound, still experienced severe and excru-

ciating pains, which he expressed by piercing cries.* I immediately proceeded to the removal of the thigh, in the same manner as in the last case: this young man being somewhat fatter, I thought proper to employ a few stitches, to retain the flaps in their place, and prevent their separation. Two cross-pieces were placed over the stump, and the whole was retained by a convenient bandage. The operation was performed readily, and without any loss of blood: a few moments after the operation, the patient became tranquil, and enjoyed several hours of comfortable sleep. The movement of the army which took place almost immediately towards Egypt, obliged me to send him away with the other wounded men. I learned too late that he perished on the march.

Authors recommend amputation of the thigh for gun-shot wounds of the leg, where the bone is fractured up to the knee-joint: this precept has no solid foundation only where the fracture is of the tibia; for experience has taught me, that even when the *fibula* is splintered up to its articulation with the condyle of the *tibia*, provided that this last is unhurt in its superior extremity, the operation is still practicable below the knee. It is only necessary in this case, after having sawed off the two bones on a level with the tuberosity, to make an incision of the soft parts which cover the *fibula*, following its direction, and lay open its joint; then separate it from the *tibia*, and extract it all together. I have performed this operation several times with complete success; it does not at all derange the operation of nature in the cicatrization of the stump, although the *tibia* shall have been cut through the thick of its con-

* I have observed, that in all extensive wounds, a few moments after the accident, the most exquisite pains and violent shootings bring on quickly convulsions and death. It is for this reason that no time ought to be lost, in cutting away the broken bones and lacerated muscles in such a manner as to render the wound as simple as possible. The operation being performed, the patient falls instantly into a state of tranquillity, and blesses the hand which has relieved him.

dyles; it does not impede the walking of the patient when he wears a wooden leg. M. ****, captain of artillery, wounded in the battle of Aboukir, was in this situation, and he walks with as much ease as if the *fibula* remained in its place.

Of Wounds made by the Weapons of the Turks or Arabs.

The balls of the Turks and Arabs are covered with a pedicle of iron, or copper, which is united with the lead when cast. This iron wire, which is about an inch long, enters into the cartridge; sometimes it unites two balls together. They were beside ragged, and of a larger calibre than those of our pieces.

These balls produce great mischief on account of their pedicles, and present greater obstacles to their extraction than those which European troops employ. This metallic wire tears the soft parts, bursts the vessels, pricks the nerves, and easily fixes the ball into the bones, more especially when it enters any of the joints. These wounds have presented various symptoms; but they have been generally more severe than those which result from our fire-arms. Hæmorrhages were the frequent consequences of the introduction of the Turkish balls, whereas, they seldom occur with our own, the extraction of which, as I have observed, is likewise less difficult.

In consequence of these circumstances, other indications were necessary to be attended to; in the first place, to stop the hæmorrhages, and afterwards to prevent or destroy the effects of the pain. For these purposes it was necessary to make deep incisions, in order to lay open the vessels to secure them, and to divide completely the nerves and aponeuroses that may be pricked or lacerated by the wire of the ball. We have been obliged likewise to enlarge the incisions, and to fabricate instruments proper for the extraction of these extraneous bodies. A pair of forceps of steel

of a sufficient thickness, a little curved, and having an opening at each of their extremities, which were hollowed, and made rough for the better receiving and holding the ball, have answered the purpose very well; but great precautions were necessary to be employed in the extraction, to avoid accidents from the passage of the ball through the soft parts.

SECTION IX.

An extraordinary courier from Alexandria brought us the intelligence of the English having effected their landing on the 8th of March, 1801, at Aboukir. The troops at Alexandria had opposed their landing, and an action took place upon the beach, which did not turn out to our advantage.

The Commander-in-chief united his forces and commenced the march on the 12th of March. We traversed the fertile plains of *Bahhireh*, at that time covered with a rich harvest. The army arrived at Alexandria by forced marches on the 19th, where we were soon informed of the situation of the enemy. The Commander-in-chief considered that there was not a moment to be lost, and an attack was determined upon for the next day by a council of war. I hastened to make the necessary preparations for the attendance on the wounded; for this purpose the surgeons both of the sea and land forces were directed to furnish a sufficient quantity of dressings and necessaries for the hospitals.

The enemy were intrenched on the Roman lines, fortified by the remains of the walls of Cæsar's camp, and the nature of the ground, defended on one side by the lake Ma'dyeh, and on the other by the sea. Their front was strengthened by redoubts, and their two flanks by gun-boats, while their

camp was covered by the fleet moored in the roads of Aboukir.

On the 21st of March at four in the morning, the signal for battle was given, and our columns advanced with firmness up to the English intrenchments. Their valour and intrepidity displayed at the first onset, seemed to insure us the victory, which indeed our brave soldiers would have obtained, but for a chain of unfortunate circumstances which occurred during the battle, (of which I can form no certain judgment) disturbed the order of the engagement, and arrested their impetuosity, when they had already gained possession of a part of the intrenchments. General Roize was carrying terror into the ranks of the enemy, when a common shot laid him dead in the midst of his troops. This misfortune obliged our army to retreat almost immediately. Thirteen hundred wounded men were the consequence of this action, which, added to six hundred proceeding from the former engagements, filled our hospitals: a great part of these wounds were severe, and required important operations. These wounded men were furnished from all the classes of the army, generals, officers, and soldiers; among the generals were Lanusse, Baudot, Destaing, Sylly, Morangie, and Boussart.

General Lanusse had the right knee pierced by a shot of small calibre; the joint was crushed; the *popliteal* artery and nerve were ruptured, and the *femur* fractured some distance up. I proposed to him immediate amputation as the only means of saving his life, which he refused; telling me, " he did not wish to survive that unfortunate day." Eight hours afterwards, however, being distracted with violent pains, he was persuaded to submit to the operation; but the vital force was exhausted, and the General died without any great suffering on the night of the operation.

General Baudot was likewise wounded in the calf of the leg with fracture of the bones. He also refused to allow of the amputation, and died a few days after in the most horrible torments.

General Sylly had the leg almost entirely carried away at the knee joint. He had lost so much blood as to be totally insensible of his situation; nor did he perceive the loss of the limb till after the amputation, which took place upon the spot. Notwithstanding the advanced age of this General (above sixty years,) and the critical circumstances of the troops, he was cured in a very short time. There is no doubt, that without the operation, this officer would have shared the fate of his colleagues.

Almost all the commanders of corps, and a great part of the officers were severely wounded; several of them died in consequence of their wounds. The greatest part of them were dressed and operated upon on the field of battle, or immediately after in the hospitals of Alexandria. All those who suffered amputation during the early hours of this day, recovered quickly and without accident.

The 21st and following days were extremely fatiguing to the surgeons. We passed the first nights as well as the days in dressing the wounded men, dispersed in the different hospitals situated in different quarters of the town.

The enemy pursuing their project, thought to cut us off and to block us up in Alexandria, whilst the main body of their army was advancing towards Rahmanieh and Cairo. In the mean time the Osmanlis, the Seapoys, and the Arabs of the Desert, following their march, approached the capital, and invested it, in concert with the English. In this situation of affairs, the division of Belliard was forced to capitulate. The garrisons of Damietta, Belbeys, and Suez, likewise capitulated after a short resistance.

To complete the blockade of Alexandria, the enemy placed their squadron before the two parts of this town, cut through the dyke of the lake Ma'dyeh, and sent a number of gun-boats into it. Being threatened by a complete blockade, and having a very small stock of provisions to support it, the Commander-in-chief sent out a caravan escorted by six hundred of the troops, to seek provisions in the neighbouring villages. But it appeared to be predestined that

nothing should succeed with us in this campaign. The caravan was taken, and we were reduced to the necessity of mixing rice flour with that of corn, which became unwholesome from its brackish and indigestible quality.

On the 20th of May I gave in a report to the Commander-in-chief of the situation of the hospitals and of the wounded. More than a thousand had returned to their respective corps perfectly cured, and about six hundred of those remaining in the hospitals were in a way of recovery.

In the month of June the winds shifting to north-east, and the overflowing of the lake *Ma'dyeh*, the waters of which came up to our camp, were the cause of an obstinate ophthalmia succeeding to the wounds hardly yet healed, and sent above three thousand men into our hospitals, so as to keep our medical officers in a constant state of activity.

This disease was combated with the most complete success, but it was in a short time replaced by a scorbutic affection, which first began to shew itself in some of the wounded men, and extended at length to so great a number of the garrison that it might be considered as epidemic. The ignorance of some persons had caused a belief of its being contagious. In order to dispel the fears which this idea inspired, and to point out the means of prevention, I addressed a circular letter to the surgeons of corps. My opinion beside agreed with that of the physician Savaresi, who then exercised the functions of physician-general, in the place of Dr. Desgenettes, whose presence was rendered necessary at Cairo, on account of the plague, which was then ravaging that garrison.

I believe that I shall be the better able to delineate the principal symptoms which characterize the scurvy, as this disease particularly affected the wounded men, and those afflicted with ophthalmia under my care. I shall follow up this description with a succinct account of the causes which produced the epidemic scurvy in Egypt, and shall point out

the different kinds of remedies which we have opposed to it, according to the different degrees of violence we have perceived in it.

In general I have observed in this scorbutic affection, as well as in that which I have before seen in North America, three different degrees.

In the first, the soldier is uneasy and melancholy; he has a great propensity to be sitting, or lying down; he is inaccessible to all moral impressions; the approach of the enemy, the unexpected movements in the camp, make no impression upon him; he loses his appetite; his sleep is uncomfortable, and interrupted by disagreeable dreams; the face becomes pale; the eyes look sad, and are surrounded with a purplish circle; the gums are painful, pale, and bleed easily on the slightest pressure: dull pains are felt in the loins and over the limbs, more especially the legs; respiration is laborious, the pulse slow and unequal; the cutaneous perspiration is suspended; the urine becomes scanty and deposits an earthy sediment; the cutaneous veins swell, particularly in the groins; the patient feels a lassitude over all his limbs, and has great difficulty in walking.

The wounds quickly alter in their appearance; the discharge diminishes, and becomes bloody; the edges of the wounds become discoloured; the granulations subside; they become purple, painful, and bleed on the slightest touch; the cicatrices also put on a peculiar aspect; sometimes they open afresh, ulcerate, and become gangrenous. This first stage points out the loss of energy, general debility, and a dimunition of the vital principle.

In the second degree, the symptoms assume a more serious character; the prostration of strength increases; the pains are more violent; they fix more immediately on the head and loins; the patient falls into a state of stupor; he lies almost motionless in his bed; his limbs are bent, and his body curved; his countenance and lips put on a livid hue; a leaden circle appears round the eyes; the breath is fetid: the gums ulcerated; and the teeth are covered with

a blackish kind of tartar. Respiration is difficult, and accompanied with oppression and tightness of the chest. The cellular membrane of the legs becomes bloated, especially that part of it lying between the tendo achillis and the tibia: this swelling in a short time extends to the whole of the limb: the swelling has a greater solidity than that of œdema; the impression of the finger sooner disappears; and pressure cannot be made without pain. Blackish spots begin to make their appearance about the ancles, and along the tibia; the same are to be found on the face and shoulders. The constipation of the bowels increases; the belly swells; the patient complains of a point of heat very intense about the præcordia, and a sense of pain and pressure about the hypochondria; the pulse is accelerated; a febrile exacerbation is perceived towards evening, and the patient is tormented greatly by watchfulness and restlessness accompanied by very violent pains. The gangrenous affection which has already shewed itself in the wounds increases. The hæmorrhages become more frequent, and the blood is of a blackish appearance, very liquid, and coagulates with great difficulty. The callus of fractures grows soft, and the bony fragments are disunited. A species of moist caries attacks the fractured extremities of the bones, which are denuded of their periosteum, and sometimes swell prodigiously.

In this second stage, nature, seeking to overcome the obstacles which hinder the exercise of her functions, redoubles her energy, and in order to re-establish the equilibrium, she endeavours to resume the powers she has lost; but most commonly in vain; a greater degree of *asthenia* soon succeeds to these exertions.

The last degree of scurvy presents the most afflicting spectacle; to a few febrile paroxysms, of greater or less duration, and to the symptoms I have just described, a general sinking succeeds: the swellings of the legs and feet sensibly increase; they became covered with blackish spots,

which, by their rapid communication with one another, present the appearance of a sphacelus of the whole limb.

This phenomenon has not been well observed by practitioners: it oftener takes place in the land scurvy than on board ship. These blackish spots, which are improperly considered gangrenous petechiæ, are nothing else than large spontaneous *ecchymoses*, arising from the rupture of the cutaneous capillary vessels, and the extravasation of blood, which appears to me to be surcharged with carbon and hydrogen, which gives it a greater degree of fluidity, and a less black colour. The blood is deprived of its caloric and of its vital principle. (The celebrated Fourcroy has made the same observation.) There can be no doubt that it experiences, as well as the vessels, in the latter periods of the disease, a greater or less change, more particularly in the parts already affected with atony and gangrene. This effect and derangement appear to be the consequence of the very strong reaction which nature imprints on the vascular and nervous system, the impulse of which is more powerful than the resistance.

The resolution of these apparent gangrenes which I have been enabled to obtain, and which attack commonly the inferior extremities, confirm me in the opinion I have just delivered. In speaking of the treatment I shall point out the repellents which are most proper for the purpose. These ecchymoses extend to the breast, arms, shoulders and face, but are less considerable in these parts, because the vessels here longer preserve their tone.

But to return to the other symptoms of scurvy in the third degree. The tongue becomes covered with a viscid and brownish coat; the ulcerations of the gums extend deeper towards the alveolar processes and the interior of the mouth; attack the *velum palati*, and even the vault of the palate; the teeth become loose, and a hæmorrhage often accompanies their final detachment, which is very difficult to restrain; the eyes become dim, and the eye-lids puffy.

A watery exudation, cold, and attended with a nauseous smell is perceived from the whole surface of the body, but more particularly from the abdomen and extremities, which renders the skin shining and of a marbled appearance. The sphincter of the anus becomes relaxed and the stools flow abundantly, constituting a diarrhœa, which indeed frequently degenerates into a dysenteric and colliquative flux. The urine passes with difficulty, and is often retained in consequence of a paralysis which attacks the bladder, in which case the frequent use of the catheter becomes necessary. The difficulty of breathing and oppression become extreme; strong fits of coughing render very painful the expectoration of a viscid matter, most frequently tinged with blood which is blackish and fetid. The pulse grows weaker, becomes vermicular, and disappears insensibly; the strength of the patient becomes totally annihilated; he experiences frequent *syncope*. The blackish spots, which at first can only be considered as *ecchymoses*, assume now the true character of sphacelus, which extinguishes life in those organs to which it extends: a dropsy succeeds, the vital functions cease, and the patient expires slowly, as it were by extinction.

The scurvy may be distinguished on account of its duration, into acute and chronic. The progress of the first kind is very rapid: I have never however seen an instance of its arriving at the third degree before the ninth or tenth day; but its progress afterwards is more precipitate. The patient usually dies in the course of four or five days. When the disease is chronic, the symptoms are less serious, but often equally fatal.

The dissection of the bodies of those who died with scurvy has presented to us, beside the external *ecchymoses* of which we have already spoken, the intestines, as it were, sunk in, and abounding with a blackish blood, the liver and spleen distended, the omentum dried up, the lungs filled with a reddish kind of serosity, their texture greatly sof-

tened, and an effusion more or less considerable of the same fluid into the cavities.

Such are the principal phenomena which the epidemic scurvy of Alexandria presented to us during the continuance of the disease and after death.

The scurvy is not contagious: nevertheless, when it is arrived at its last stage, it may exert a bad influence on those who labour under the first degree of it, and even incommode those in sound health who may sleep near the patient, by disposing them more or less to putrid affections; therefore it becomes necessary to separate the scorbutic patients, although there is no fear of the disease communicating itself when it is only in the first or second degree. Nevertheless, for the sake of quiet and cleanliness, it is best to forbid the men drinking out of the same cup with a comrade whose mouth is affected.

Several important causes have appeared to me to have been productive of this epidemic. The waters of the lake of Ma'dyeh being turned into the lake Mareotis, and the loss we sustained of a strong caravan of camels, deprived us of all communication with Egypt. We were then under the necessity of computing our resources according to the duration of the siege of Alexandria, the blockade of which was now complete. The soldiers were very soon deprived of vegetables and fresh meat. The bread, on account of the scarcity of wheat, was compounded of equal parts of wheat and rice. Over and above the natural indigestible quality of the rice, when taken in large quantities, this was likewise saturated with salt. (It is thus prepared for commerce). The bread was consequently very salt, which must necessarily impair the digestive organs, and the whole system.

The soldiers were fed on this bread for two months; they made also a great consumption of salt-fish which they purchased of the inhabitants at a very low rate. They likewise used the water of the cisterns, which was at that time

vitiated, as well by the filtration of the water of the sea, or of the lake, now risen to the level of many of these cisterns, as by a state of putrefaction occasioned by the accumulation of mud in the cisterns, which had not for a very long time been cleansed. It is to this unwholesome kind of diet, that we must attribute the presence of scurvy in the garrison.

The ophthalmia, and the wounds which had already injured the health of a great part of them, likewise disposed them to the attack of this disease in consequence of the degree of debility in which they were left, and of their long residence in the hospitals, where they respired plentifully animal exhalations extremely favourable to the developement of this affection. The exhalations arising from a number of persons crowded into the same ward badly aired is a frequent cause of the production of scurvy.

The chief predisposing cause of this malady was the almost continual humidity to which the soldiers were exposed after the overflow of the lake Ma'dyeh. It brought with it an abundance of mephitic gas, arising, on one hand, from the decomposition of a great number of vegetable and animal substances which are found in the lake Mareotis; and on the other, from the infected privies spread over the whole town of Alexandria. The camp privies, the mephitic vapours of which increased in proportion to the troops, and the five and twenty or thirty hospitals which we had established here, rendered the residence dangerous. Lastly, the saline atmosphere of the sea, and the necessity we were under for a long time of living on the *qui vive* on account of the enemy; remaining almost constantly at bivouac, may have also contributed to the alteration in the health of the troops.

At first the scurvy only discovered very slight symptoms, such as redness, and superficial ulceration of the gums, wandering pains in the limbs, indolence, and restlessness.

It attacked at first a pretty considerable number of our men. The change of the bread, which was no longer salt, as we caused the rice to be washed previous to being ground; a distribution of vinegar, dates, molasses and coffee, appeared to dissipate this affection, or at least to retard its effects; but, as we were altogether deprived of fresh meat, the disease continued to advance, and put on an epidemic character. A great part of the army and of the inhabitants were attacked at the same time, in such a manner, that by the middle of August there were fourteen or fifteen hundred scorbutic patients in the hospitals of Alexandria. There died on an average four and five in a day; the inhabitants lost from six to eight, which implies that amongst them there existed a greater number of sick, and a greater degree of intensity in the causes producing it. They were, in fact, often deprived of fresh water, and possessed no other aliment but bad rice.

It is worthy of remark, that during the whole time of the continuance of this epidemic, there only occurred one or two cases of plague, while at the same time it was committing ravages at Cairo, and in Upper Egypt. May we not conclude from this circumstance, that one epidemic becomes a preservative from another in the same country? The Egyptians themselves have constantly observed, that when the small-pox is epidemic, the plague does not shew itself; and *vice versa*.

The officers have been less exposed in proportion to the scurvy than the men, having been able to use a better diet. It has otherwise attacked persons of every age: its effects were more rapid, and generally more fatal, when the patients had previously experienced the effects of some other illness, or of severe wounds, or ophthalmia. I have seen a tolerable proportion of patients in whom the lower extremities were tending towards sphacelus, and who, nevertheless, by the assistance of the remedies we are about to point out, have had a resolution of these extensive *ecchymoses* brought

about, and obtained a perfect cure in almost all the instances.

The horses of the garrison having become almost useless on account of the strictness of the blockade, and the scantiness of the forage; I asked of the Commander-in-chief to have them killed, for the nourishment of the soldiers and the sick. Experience had before convinced me on more than one occasion, that the flesh of these animals, especially when young, as were our Arabian horses, was wholesome, very good for making soup, and, with a little preparation, very pleasant to the taste. They were accordingly served out every day by order of the Commander-in-chief.

This innovation at first excited murmuring amongst certain pusillanimous persons, ill informed, who considered the use of this kind of meat pernicious to the health of the troops. I was however fortunate enough to establish, by my own example, an entire confidence in this kind of fresh meat, the only one we possessed. The patients found it agree with them very well; and I am confident to assert, that it was the principal means of arresting the progress of this malady. The bread likewise no longer disagreed with the men, when the rice of which it was made, was previously steeped in water.

The treatment of the disease was varied according to the different stages of scurvy, the constitution of the patient, and several other circumstances; although, till the capitulation of Alexandria, we were in great penury of a number of articles.

However, in the midst of all this distress, we had the good fortune to receive several cases of medicines from France, containing especially some excellent Peruvian bark, ipecacuanha and cantharides. We received at the same time two other cases from Rosetta, containing a complete assortment of all kinds of medicines. Beside this we found at Alexandria several quintals of tamarinds; and, lastly, a small Greek vessel chanced to run a-ground in the harbour of this town loaded with lemons. These, however, being

already too ripe, lasted but a few days. We had in fact for the most part medicines enough to go on till the month of September, as the principal medical officers stated in a council of war held on the 28th of August, to consider on the surrender of the place.

In the first stage of scurvy, a few slight emetics of ipecacuanha, followed by gentle laxatives, were found extremely advantageous. The patient took for his common drink tamarind water sweetened with molasses. In the evening, an acidulated antispasmodic draught; and one or two cups of coffee in the morning were regularly administered to our sick; and they were directed to perform frequent ablutions with a mucilaginous wash, sharpened with vinegar made from sugar.

A severe low diet was always favourable to the propagation of the disease, for which reason the scorbutic patients were never deprived of any light kind of food, such as broths, or a porridge either of rice or vermicelli. The coffee was repeated in the course of the day, when no wine was to be had. The vinegar made from sugar was employed as a gargle. These means, together with moderate exercise, were in a great proportion of cases sufficient to restore the health of the patients. They rejoined their respective corps encamped on the borders of the lake Mareotis, where the greatest part of them being exposed to fresh causes of *asthenia*, were shortly afterwards attacked again with the same disease; in which case it appeared in a more serious form, and made a much more rapid progress. The cicatrices and the wounds, which, in the first attack had scarcely altered their colour, were commonly burst out and ulcerated when they were admitted a second time into the hospital. All the other symptoms of scurvy made a rapid transition from the first to the second stage of the disease, and shortly after to the third. In this state of things, the patient's strength is exhausted, and the muscular power almost annihilated; there is no time to lose in the employment of weak remedies; we consequently added to

the acidulated draughts, camphor and opium. I have observed that this last remedy especially proved in a particular manner efficacious in removing the disease. I had already employed it with great success at the hotel of invalids at Paris, and at the military hospital. In the morning a dose of bark was given to the patient infused in very weak rum. Their ordinary drink was either oxycrate, or tamarind water sugared. When the patients were arrived at the third stage of the disease, the dose of cinchona mixed with spirits was forced upon them, and repeated several times in the day: the quantity of camphor, opium, and coffee was likewise augmented.

Blisters were generally found hurtful, on account of the gangrenous ulcers which almost constantly resulted from their use. I substituted, with great advantage, for these remedies, embrocations of very hot vinegar. The wounds were dressed with vinegar saturated with camphor, and with powdered bark. Embrocations of camphorated spirit, and storax plasters, powdered over with flor. sulphur. applied hot to the *ecchymoses* and œdematous swellings of the legs, supported by a moderately tight bandage, were of great service, co-operating with the internal medicines. These plasters ought to be changed every three or four days, and the use continued to the end of the cure.

Out of three thousand five hundred scorbutic patients who were received into the hospitals of Alexandria, two hundred and seventy-two perished, from the first appearance of the disease in July 1801, to the period of embarkation (10th of October). More than two thousand rejoined their battalions, before, or during the period of the embarkation of the troops. About seven hundred returned to France, all of which were recovered, or in a fair way of recovery on entering into quarantine, with the exception of six or seven who died on the passage. Above a hundred of those most severely affected were left behind at Alexandria: they returned a short time afterwards to their country,

without having experienced, in proportion to their numbers, a greater loss of men than the others.

At the capitulation the English furnished us with wine, fresh meat, and vegetables, which contributed in a great measure to the complete restoration of our sick.

On the 17th of August the allied powers attacked our lines at all points; and though very superior in number, were repulsed vigorously and with some loss. This first attempt was followed in the course of a fortnight with several other partial attacks, which furnished a tolerable number of wounded men. They were all dressed as soon possible on the field of battle, by the corps of ambulance which I had established in the rear of each division: from thence they were transported to the place of arms in the centre of the town, where a temporary building was erected for their reception, the hospitals of the town being crowded with sick.

In the mean time the grand body of the enemy's troops penetrated the peninsula of Alexandria, and forcing the troops opposed to them, made themselves masters of the ramparts of the old town. The cross fire from the fleet on one side, and the gun-boats on the other, obliged our battalions to retire to the second line. Fort Marabou was carried by storm, in which affair two surgeons of the navy stationed there by myself, were killed; a third had one leg carried off, and the other crushed to pieces. This brave officer owes his safety to an amputation I performed on the thick of the condyles, a very few hours after the action.

We were now closely beset and blockaded on every side; our hospitals were crowded to excess with sick and wounded. The total want of many articles of the first necessity, and doubtless many other motives unknown to me, gave rise to a negociation between the commanders of the two armies, which terminated in a capitulation signed on the 31st of August; the principal condition of which was, that the

French troops should return to their country with all the honours of war.

I availed myself of the opportunity furnished by the capitulation of visiting the English camp and hospitals. In this visit, I was accompanied by the medical-inspector-general of the English army, Mr. Yonck (*most probably Young*), who had the entire direction and administration of the whole medical department, without having any one between himself and the Commander-in-chief. Their corps of ambulance appeared to be well appointed, and provided with every thing necessary: their practice too appeared to me to have been successful; but I was much astonished to find that only three cases of amputation out of a tolerably large number amputated, had been cured. I have rendered an account of the causes of my success in my memoir on amputations. This again proves the superiority of the French surgery over that of all other nations, even the most civilized.

It was in the midst of the English camp that we first saw this army of Indians (Seapoys) of which I have already spoken. Their costume differed very little from that of the Arabs; their manners and customs too are nearly the same. Men of all nations are to be met with amongst them, especially French. This little army, consisting of about eight thousand men, came from Ceylon, the Gulf of Bengal, and the coast of Coromandel. They had traversed a space of more than three thousand leagues to arrive at Egypt, passing by the Red Sea. Notwithstanding all the difficulties and privations of so long and tedious a passage, they arrived in tolerably good condition, and time enough to swell the numbers of the enemy. These troops being better seasoned than those coming from England, suffered less from the ophthalmia and plague.

It was observed that more Europeans died of dysentery and hepatitis, and more Indians of the plague and yellow fever. This army was on the whole reduced to somewhere

about seven thousand, when they embarked again on the Red Sea to return to India.

By virtue of an article in the capitulation, we were ordered to concert measures with the Inspector of Hospitals of the English army, in order to determine what was to be done with such sick and wounded as were not in a condition to return to France, and to provide for the embarkation of those who were in a situation to return.

The number of sick and wounded who were embarked amounted to 1338, beside the corps of invalids. The embarkation was not effected without great difficulty.

All these patients, conveyed in twelve hospital vessels, arrived happily at Marseilles, and in a short space of time. A hundred and thirty wounded, or bad cases of scurvy, were left at Alexandria under the protection of the English, until they should be completely cured; and were placed particularly under the direction of the Inspector General Young: they were attended by French surgeons. In the course of two months, all these patients were recovered, and returned safely to France.

On the 24th of October, 1801, we set sail at day-break. I could not behold without emotion, and sincere regret, our departure from the shores of this interesting country:—a country in which the French, in a short space of time, had effected so many prodigies; where they left behind them traces of their genius, which they abandoned at the moment they were about to receive the fruits of all their painful labours; and where they already beheld the wisest and most useful institutions flourishing under their auspices.

CAMPAIGN OF AUSTERLITZ.

On the 22d of December, 1804, Napoleon Bonaparte was solemnly invested by the Pope with the dignity of Emperor of the French, under the name of Napoleon I.

Soon after this celebrated event, the Emperor appeared again at the head of his armies to revenge the violation of the treaty of Amiens by the English, and gave orders for great preparations to be made to effect a descent on England. The imperial head-quarters were established at Boulogne, to which place I was ordered by his Majesty to repair. The troops were already embarked, and waited only the arrival of two French fleets and one Spanish, that were to protect the flotilla, and increase the means of attack. It is impossible to express what an imposing appearance this armament presented. If we are to judge by the movements which the English appeared to make, they were already struck with terror, and were unable to prevent the invasion which threatened them.

However in the midst of these immense preparations, a new continental coalition was formed: France, in her turn, was threatened by the armaments and pretensions of Austria. It was in this short interval that the combined fleet, on its way to the place of its destination, fell in with that of Admiral Nelson, and the terrible and memorable battle of Trafalgar was fought. From this moment the face of every thing was changed; a new plan was resolved upon for the campaign; and in an instant the vast genius of the Emperor provided for all! The troops were ordered to disembark; they form into columns; traverse France with rapidity, cross

the Rhine, and enter into Germany, whilst the enemy is scarcely yet informed of their march.

After having followed the Emperor to Paris I repaired to Strasburgh, where I organized a division of flying ambulance for the imperial guard. The Emperor arrived in this town on the 4th of September, 1805, and the whole army passed the Rhine before the evening of the 10th. We advanced by rapid marches towards the Danube, where the enemy were. The body of troops forming the advanced guard, were here several times engaged with the enemy, and forced the passage of the river. These first successes caused great consternation to the enemy, who retreated precipitately towards Ulm and Elchingen. The passage of the river was again disputed at Leypeun, and at Elchingen. A serious engagement here took place, which cost the enemy a great many men. The wounded of both nations were collected together in the abbey of Elchingen, where they were indiscriminately attended. The amputations we were obliged to perform here for several of the wounded did not succeed so well as they usually have done with us, because the greatest part of these wounded men had been exposed to the injuries of the weather, which was very severe, for six and thirty hours.

The reduction of Ulm soon after took place, an event which struck terror into the rest of the enemy, and made a lively impression on the inhabitants of Germany. This was one of the most astonishing and remarkable of all the military events in the course of the war.

The Austrians were in full retreat towards their capital, and the French army doubled their expedition to come up with them.

The army of Italy, and a column of French troops directed towards the Tyrol, had likewise made a progress similar to that of the grand army. The advanced guard, commanded by Prince Murat, entered without resistance into Vienna, and made prisoners some of the rear-guard of the Austrians.

The snow and rain had accompanied us to Vienna, and the rapidity of our marches had not allowed the soldiers to dry their clothes; in spite however of these and other difficulties we had scarcely any sick: it seemed indeed on our entry into Vienna that the health of the troops was become more robust.

The rest of the Austrian army having taken the route for Moravia, the Emperor left Vienna on the 26th of November, to go in search of them. We soon after learned that the advanced guard of our army had sustained a warm combat with the Russians at Hollabrun. In fact, the next day we found the wounded men in the town, and the field of battle covered with dead, and with the spoils of the Russians. I halted my ambulance to give them the necessary assistance.

Murat took possession of Brün without resistance, where the convents and hospitals offered us great resources for the relief of our wounded. They were immediately occupied, foreseeing that the two armies would meet near this city, and that the shock would be most violent, consequently plenty of room would be required for the reception of the wounded. The inhabitants of the town, hospitable and humane, as they are all over Germany, assisted us with all their resources.

Eight or ten days passed over in observation and parleys. In fine, all necessary preparations were made at Brün for receiving the wounded of a great battle, which was considered inevitable, and which alone could insure an advantageous peace.

Knowing the hostile intentions of the Russians, the Emperor put his army in motion, and placed it in front of the enemy on a circular range of hills, where he remained with it at bivouac. On the first of December all the preparations were made for giving battle the next day.

M. Percy, the director-general of the medical department, being absent, his Majesty charged me with that service,

ordering me at the same time to take all the necessary measures to assure a prompt assistance to the wounded.

Having gone through all the posts of ambulance, I hastened to give the necessary orders to the principal surgeons of corps, and to the first surgeons of the ambulances, that they might be ready the next day to repair to their respective posts as I had arranged.

At day-break the signal for battle was given on both sides, the enemy being equally determined and prepared to engage on that day. The shock was dreadful, but there was no doubt of the result; the most splendid and complete victory. This memorable day was named the day of the Three Emperors, or the battle of Austerlitz. It cost the enemy more than forty standards, a hundred and twenty pieces of cannon, twenty generals, more than thirty thousand prisoners, ten or twelve thousand left dead on the field of battle, or drowned in the lakes, and a considerable number of wounded which we picked up, and removed the following days to Brün. The wounded French were almost all dressed on the field of battle, as the weather was favourable.

The inspector-general, Percy, having rejoined about the middle of the battle, I returned to my post in the imperial guard. The first wounded men which they furnished were from a terrible charge which they made on the Russian imperial guard. They were all dressed on the field of battle, operated upon, carried off by the carriages of our flying ambulance, and transported to the central ambulance, which I had established in the granary of a mill at ****.

Never did a field of battle present a picture of destruction like that of Austerlitz. It was covered with dead, dying, wounded, innumerable fragments of arms, and of all sorts of effects, abandoned by the Russians in the first moments of the combat.

The Emperor pursued for several leagues the remains of the Austro-Russian army, but halted with his advanced

guard at bivouac at Saruchitz, in order to receive the envoys of the Czar Alexander, and the Emperor Francis, who demanded an interview.

After this conference the Emperor Napoleon and the imperial guard returned to Brün, where the negociations were opened, and continued till the definitive conclusion of the peace which was signed some time after at Presburg.

Epidemic Disease of Brün.

We had scarcely collected together in the town of Brün, the wounded of the French and Russians, the number of which was very considerable, when an epidemic disease broke out amongst them, which was recognised to be the putrid, nervous, malignant fever, *(adynamico-ataxique)*, or the contagious typhus of the ancient Nosologists. It made its attack by compressive pains in the head, by irregular shiverings, especially of the extremities. These shiverings were followed by a burning heat, but of short duration.

The wounds, the suppuration of which at first diminished, put on a putrid appearance, and this gangrenous affection afterwards made a very rapid progress. The pains of the head, the external heat and anxiety increased: the pulse, which in the beginning was small and slow, became quicker and unequal; the urine was turbid and yellowish. In some patients the stools were very scanty; but in the greatest number diarrhœa was one of the first symptoms of the disease. The sense of hearing and of sight acquire an extreme sensibility: the functions of the muscular system are disturbed; trembling of the limbs, subsultus tendinum, and commonly delirium attack the patient towards the end of this first period.

To these first symptoms succeed pains in the epigastric region, wandering colics, vomits preceded and accompanied by hiccup, a retention, sometimes a suppression of urine,

clammy and colliquative sweats, an increase of the dysenteric flux, with a discharge of blackish and fetid blood; and, lastly, nasal hæmorrhages. The tongue was black in the centre, dry and red on the edges; the gums and teeth were covered with a glutinous and blackish coat. The patient fell into a state of drowsiness and general insensibility; he made a few mechanical motions, of short duration on account of the prostration of strength. The pulse diminished in fulness, as it increased in velocity; the features of the countenance became decomposed in an astonishing manner, and discovered to the least practised eye the change of the organic functions. Every time I beheld this sign in the first period, I foresaw the fatal termination of the disease.

The greatest part of these symptoms, by becoming worse, pointed out the passage from the second to the third period. The pulse became intermittent; exacerbations came on once or even twice in the twenty-four hours. During the exacerbations the delirium in some patients became furious, and was often accompanied by convulsions. The urine becoming thicker and more scanty, was an unfortunate sign, and if all at once it became clear and limpid, the danger was at its highest degree; the abdomen then became distended by flatulence; the internal spasm increased; the hiccup returned; the patient lost entirely the use of his intellectual faculties; fell into a state of extreme debility, and sunk quickly under the disease. When it terminated in this manner the wounded men seldom exceeded the ninth day; most commonly they died on the fifth or seventh. It was in this last stage that the wounds put on the true gangrenous character, and diffused to a great distance a most fetid odour. The miasmata produced by the secretion, or purulent exhalation of these ulcers, were extremely contagious; and the patients in the vicinity of those attacked with the epidemic, even the medical men who attended them, had to fear in an extraordinary manner the invasion of the disease. In short, the wounded men in the same

wards, were not long before they experienced the same symptoms. The evil propagated itself from one to another; infected the hospitals, and the neighbouring houses in succession, in consequence of the frequent communications of the individuals affected, and perhaps of the transmission of deleterious miasmata by the south winds, especially when they had a very short distance to traverse: these winds likewise are favourable to the developement of *ataxic* diseases. We have already made the same remark with regard to the plague.

The removal of the patients also contributed to the progress of the contagion, which spread in such a manner, that, in less than a month, the hospitals of the line had lost more than a fourth of their wounded. Those who had fractures of the limbs, and in a remarkable degree, those who had fractures of the lower extremities, were the first victims. This circumstance added to the motives I have explained, in my memoir on amputations, for the necessity of taking off the limb on the field of battle, whenever the fractures do not offer an assurance of a perfect cure by the use of the ordinary means.

The hospitals of the fever patients became crowded in a short time, and the mortality was likewise proportionally great. The epidemic appeared at the same time amongst the Russian prisoners, which we had been obliged to crowd together in great numbers into the churches and other large buildings: lastly, it was not long before it began to spread amongst the inhabitants; and it extended itself in the end along the whole line of evacuation to France, by means of the removal of the sick of both nations, and of the prisoners.

The progress of the symptoms was not alike in all the patients: it was more slow, or more rapid; and its termination was regulated by this difference.

When the disease attacked patients wounded in the thigh, it advanced with extreme rapidity, and nothing abated the symptoms. I have witnessed some among the superior

officers, whose wounds, of this kind, were in a most promising way, die almost instantaneously. In less severe wounds, the disease commonly shewed less violence, and its progress was slower: with proper remedies timely administered, we succeeded in saving many of these patients.

The symptoms have beside presented differences, both as to their character and time of attack. At one time the *adynamic* affection predominated, and made its appearance with its usual train of symptoms. At another time it was the *ataxia*; it had likewise its peculiar type. Wounds with injury of the joints, fractures of the limbs, lesions of the parietes of the great cavities, and hæmorrhages, most commonly were attacked with *adynamia*, which manifested itself by nauseas, vomitings, hiccup, pains of the bowels, disturbance of the alvine functions, frequency and feebleness of pulse; by a catarrhal affection of the lungs, and an alteration more or less strong in the features of the countenance. Internal heat, thirst, fever, and anxiety come on almost instantly, and at the same time the wounds exhibit an appearance of gangrene, or of the hospital sphacelus. The rapidity of the progress of this last evil, bore always a relation to the situation of the subject, to his age, or to his moral susceptibility.

Wounds of the head, and of all other parts of the body, were complicated with ataxia; whilst, by the inconsiderate application to these wounds of spirituous liquors, styptics, or astringent and cold applications, such as brandy, bitter decoctions of bark, vinegar, or oxycrate, extolled it is true by some practitioners, a metastasis of the putrid and deleterious principles of the purulent matter was determined towards the brain. The ataxic affection in this case declares itself by cephalalgia, partial or general paralysis, involuntary stools, incontinence of urine, loss of knowledge, alteration of the senses, except that of hearing, which appears to participate with the functions of organic life; so likewise, whilst it is separately extinct, the prognosis is less unfavourable, and there is more hope, as the adynamia

ought then to exist by itself. Lastly, delirium and stupor come on, and if the means pointed out be not immediately opposed to its fatal effects, the patient dies in a short time.

Such are the differences which these two affections present, which might moreover develope themselves at the same time, by the association of the spontaneous causes of which we have just spoken with those which proceed, as we may say from without, such as an unwholesome temperature, an injurious quality of the winds, unheathy situations, bad diet, &c. It is this union of causes which characterize the hospital or jail fever, designated under different names by the ancient Nosologists, and under that of *adynamico-ataxia* by the modern nomenclature. Whilst the epidemic of Brün was advancing with this complication of appearances, which was most commonly the case, it often put on a dangerous aspect, and the patients died in the third or fourth exacerbation.

This epidemic was scarcely felt by the wounded men of the imperial guard, whom I had placed in the *hôpital de la Charité:* it was at a distance from the other hospitals, isolated from the populous quarters of the town, well ventilated, and in excellent repair. We lost here but few of our wounded or fever patients. An attack of this fever had greatly endangered the life of the Commissary of War; he had contracted it by the frequent communications with the prisoners of war which his duty subjected him to.

The causes of this epidemic ought to be looked for in the fatigues and privations which the troops of both nations had undergone in the vicissitudes of the weather, the crowding together of the prisoners, wounded and sick of both armies, in the bad diet and state of forced inaction in which these troops were obliged to remain after such long, rapid, and fatiguing marches.

The prognosis was extremely unfavourable when the ataxia predominated, whilst the wounds were situated near any of the internal organs, or the great joints, or the pa-

tients were young and of an irritable habit. I have observed that soldiers of more advanced age resisted this fever better. Its progress was also slower, and shewed less danger in those patients in whom the adynamia predominated in its turn, especially when it was not attended with exacerbations.

The indications of cure bore a relation to the nature of the affection, to its symptoms, and different periods. When the disease commenced by symptoms of remittent ataxic fever, cupping glasses with scarification to the back of the neck and to the hypochondria, sinapisms to the soles of the feet, suppurative and antiseptic stimulants to the wounds, drinks acidulated with mineral substances, and theriacal ethereal draughts arrested its progress, and averted the danger. Bleeding, which has been extolled and practised by some physicians, was constantly fatal. One of our most valuable colleagues, Dr. Roussel, who chose contrary to my advice to employ it for himself at the first onset of the disease (which he had contracted in the hospital), was the victim of this practice, and died on the seventh day, notwithstanding the assistance he received from his colleagues. It will not do even to be too prodigal of the scarifications, which nevertheless it is important should be applied properly. If the disease continues to advance, and the ataxia constantly prevails, it will be necessary to add to the means we have just pointed out, camphor and musk; the drinks must be strongly impregnated with the mineral acids; the whole surface of the body should be washed with camphorated vinegar, which should be employed cold, and even with ice, when the animal heat is great. Lastly, it is necessary to use rubefacients to the feet, legs, and back of the neck; and to apply to these parts transitory blisters.*

Opium, recommended by some authors, is hurtful in this affection, and the bark ought not to be administered until

* *Vesicatoires volans.* Blisters left long enough on the skin to excite inflammation and redness, but not to detach the cuticle. Translator.

after the first stage of the disease, that is to say, when the irritation is allayed: it may be employed differently according to circumstances. If nervous symptoms predominate, it should be given in decoction, with other bitters, and the anodyne liquor of Hoffman joined to it. It may afterwards by degrees be administered in substance, in doses more or less strong, adding to it the sulphuric æther and the acetate of ammonia. The use of wine and coffee ought by no means to be neglected, if the patient is in a situation to procure any. I have in general gained the greatest advantages from the employment, varied and modified, of these different remedies against typhus. I was enabled moreover, by the opening of the dead bodies of those who died of the epidemic, to confirm myself in an opinion I had long entertained, that the ataxia exerted its energy more particularly on the nervous system, and the adynamia on the organic. In short, in the first affection we constantly find the brain suffering, or its arteries distended with blood, of a black appearance; while in the second, the thoracic and abdominal viscera, and most commonly the stomach and intestines, have always undergone more or less alteration.

When the disease was ushered in by symptoms of adynamia, especially dependant on the derangement of the stomach and bowels, after a vomit of ipecacuanha and emetic tartar taken in small successive doses, the bark was instantly administered, combined with opium and rhubarb, and given in a glass of good wine, or in a decoction of serpentary and angelica, and assisted by theriacal æthereal draughts, clysters of camphorated bark, frequent washings with vinegar over the whole surface of the body, vinous lemonade, and stimulating frictions of the abdomen. The wounds in these cases which are attacked with the hospital gangrene, should be dressed with vegetable or mineral acids, camphor and bark, combined with some balsamic substance, such as turpentine. Spirituous applications do not at all answer, inasmuch as they dry up, and render the ulcerated vessels horny, and produce tumefaction of the

sound subjacent vessels which accelerate the progress of the gangrene.*

For those labouring under adynamic fever, I have remarked that blisters have not procured the advantages which have been ascribed to them: the excoriations resulting from their application put on very quickly the appearance of moist gangrene: the putrescence increases, and the degree of general asthenia continues the same.

On the contrary, where the *ataxia* predominates, they may be productive of excellent effects: the *cutis vera* preserves its strength and elasticity; mortification here takes place more difficultly: and by reason of the serous and purulent discharge, the capillary system empties itself, and the brain becomes relieved of its pressure. These blisters should be applied to the back of the neck and to the legs, but the precaution must be had not to remove the epidermis; it ought to come away of itself, and without any effort: the dressings should consist of cerate of saffron.

Nature sometimes assists the action of remedies; and precedes their operations by a salutary crisis, such as critical abscesses, profuse sweats, copious evacuations, and the return of suppuration in the wounds. These crises, which do not always take place, happen commonly from the seventh to the thirteenth day.

I shall confine myself to this short account, not intending to enter into further details on the theory of these kind of diseases, which without doubt will be treated of *ex professo* by the physicians of the grand army.

As the fatal consequences of the progress of this kind of epidemic were foreseen, every measure was taken to hasten

* I cannot but suspect that the fears of M. Larrey with respect to the application of spirits to wounds in a state of gangrene, are founded more upon speculation and theory, than upon absolute experience. The great extent to which I have seen this practice carried in our West India hospitals, where the hospital gangrene is of frequent occurrence, warrants the conclusion that these applications are not noxious, but even frequently productive of the happiest effects. TRANSLATOR.

the departure of the prisoners of war for France. Afterwards the evacuation of the sick and wounded took place. They were transferred to Vienna, where large hospitals were preparing for their reception. The temperature moreover changed, and the most piercing cold succeeded to the rainy and tolerably hot weather that we had experienced since the battle. This atmospheric revolution, together with the removal, change of place, and the attentive care which they received, arrested the progress of the epidemic, and diminished its effects. From this moment the wounded men proceeded hastily to recovery, and the wounds of almost all the French sent into this town were perfectly cured. Amongst the wounded Russians and the prisoners of war, the epidemic continued to rage until their arrival in France. This obstinacy of the disease was owing to the want of cleanliness of these persons, notwithstanding all the care and attention they received from the French assistants of the hospitals. It was owing likewise to their state of apathy and unconcern, as well as to their being so crowded together in all the places where they halted on the line of evacuation. These places, however, large and numerous they were, were always insufficient, on account of their bad distribution, and of their great numbers. It was without doubt the same reason why our own sick and wounded were not received into separate accommodations along the same line of evacuation. The mixture of persons, which consequently took place almost every where, propagated the disease from one nation to the other, and caused the epidemic to extend throughout the whole line of march. This melancholy event might have been prevented if, from Vienna to France, as I then hinted, two lines of evacuation, by two different routes, had been established, one for the French, the other for the Russians; but this was without doubt at the time impracticable.

Memoir on the Effects of the Rheumatic Habit of Body, on the Fibrous and Osseous Systems.

It is extremely difficult to give a satisfactory explanation of the unfortunate consequences resulting from a rheumatic taint to the fibrous and osseous systems, more especially in those persons in whom the process of ossification is not yet accomplished. Notwithstanding the obscurity of the progress of this disease, and the variety of its symptoms, I am of opinion that the rheumatic principle, without doubt by its deleterious properties, deprives the *fibro-cartilaginous* substance and the osseous vessels of their vitality. This substance then loses its elasticity and organic sensibility; the lymphatic vessels, which are not accessible to the action of the morbid cause, from which they appear to receive only a sympathetic irritation, absorb, with fresh force, the molecules of these substances, which are become, if we may be allowed the expression, inert, and are at length worn down by degrees, or eaten away: by these means the lymphatics produce a loss of substance in the solid parts, and in all the points contiguous to the seat of the disease, and a latent inflammation accompanied with a sort of serous and purulent secretion, which gives rise to abscesses by congestion. The presence of this heterogeneous fluid in the point where the bones or ligamentous cartilages have already undergone some change, assists the progress of the caries, and extends the disease to a great depth. The absorbent system in these subjects possesses a great degree of energy, and the phosphate of lime easily abandons the bones, because they have not yet acquired the necessary degree of density to resist, either the direct action of the virus, or the indirect action of the lymphatic vessels. The patients which have come under our observation, were all young soldiers, from eighteen to twenty years of age. Of these we shall give some instances.

I shall not here point out the various appearances which this virus presents, according to the peculiar seat to which it may chance to be determined. They may be found detailed in the works of Pott, and in the Memoirs of the Royal Academy of Surgery. This disease proves generally fatal, unless it be met early by the treatment pointed out. The success which I have obtained from the use of some of these means, seldom employed with sufficient courage and perseverance, has induced me to think, that if they were employed from the first attack of the disease, they would often prevent its fatal consequences.

These means consist in the employment of such things as strongly stimulate the injured parts, so as to restore the tone of the weakened vessels, as well as their proper and natural sensibility.

In many cases considered desperate, cupping glasses with scarifications, where there was the least sign of local turgescence, the moxa and the actual cautery, topically applied, have produced the most happy effects. Mercurial frictions, as near as possible to the seat of the mischief, and applied at the interval of four or five days, have appeared to me to have been of the greatest service, and to have contributed principally towards the cure, even supposing no venereal virus to have existed. I have also observed that this remedy was productive of excellent effects in all those complaints improperly called lymphatic, provided the patients be not already exhausted.

When the abscess declares itself at some superficial opening, which corresponds with the purulent sinuses, proceeding from the seat of the disease, it may be attacked with some degree of success. When, after the employment of external and internal remedies, this abscess continues in the same state, it is a sign of the suspension of the process of the caries: I then get out as much as possible of the matter by means of a cupping glass, applied so as to embrace the whole of the tumor, and both (if two)

openings. I then pass a seton through from one opening to the other, and apply over it a compress dipped in camphorated oil, and a retaining bandage.

Contrary to the generally received opinion, I always evacuate the whole of the fluid, in the first operation, without fearing the consequences arising from the contact of the air, which would be certainly much more prejudicial if it entered in any quantity into the purulent sac, where it would quickly go into decomposition, and infect the patient; whereas by the above method this is prevented. The application of the moxa should be continued on the points corresponding with the caries as well as the mercurial frictions. Internally, sudorifics combined with bitters, sometimes with the bark, and a few mercurial salts, which are best administered separately in appropriate vehicles, are the remedies which have best succeeded in my hands. I consider however topical applications as the most efficacious in this disease, when its admits of cure.

I am of opinion that a hope of this may be entertained; 1st, when it is not greatly advanced, and is within the reach of assistance from art; 2dly, when the patient is young, and labours under no other taint, such as venereal or scrophula; 3dly, when the caries is not deep seated, and is at a distance from any internal organ.

It may easily be conceived, that the disease in its incipient state may be arrested, and its first effects counteracted by re-establishing the tone of the parts and the circulation of the fluids. I can produce many instances of this. But how can we account for the success obtained when the abscess is already formed, aud probably the caries begun? The explanation is extremely difficult, perhaps impossible: I shall content myself with relating faithfully the cases I have collected.

One of the first instances that occurred was that of a young soldier of the guards, who was received into the hospital on our return from Austerlitz, with all the symptoms

of an incipient spontaneous luxation of the left thigh, at the hip-joint, such as a sharp pain in the part, immobility of the limb, its preternatural elongation, projection of the trochanter, wasting of the limb, and a febrile affection. After some preparatives, I put the patient on the use of tonic and depurative medicines, such as we have spoken of, sometimes in diluting drinks, sometimes in boluses and draughts, whilst no time was lost in applying all round the joint cupping glasses with scarifications, some short continued blisters, and a sufficient number of moxas. I always take the precaution to prevent the ulceration from the burns of the moxas by the immediate application of ammonia.

The symptoms subsided by degrees; and on the application of the ninth moxa they had entirely disappeared. I nevertheless applied several more in order to be assured of the cure. Some mercurial frictions were likewise employed round the thigh and the pelvis.

Eleven subjects of the same age have since presented themselves at the same hospital, labouring under the same affection either at the hip or knee-joints. In five of these the cure was almost complete; there scarcely remained the slightest halting, and a shortening of the limb from five to ten lines: they were however obliged to be invalided. In three others, the spontaneous luxation was established; that is to say, the appearances pointed out by authors as indicative of this luxation existed, such as a decided shortening of the limb, the deviation of the foot and knee from their natural position, mostly outwards; the elevation of the great trochanter, stiffness, pain in performing the movements of the thigh, and above all, an impossibility of bending it. Is it the head of the *femur*, which absolutely comes out uninjured from the cavity of the acetabulum, and is placed on one of the external points of the edge of that cavity likewise uninjured? Or is it a wearing away, a reduction of the head of that bone? Or, lastly, an excavation more or less deep in the articular cavity which produces the shortness and consequent deformity of the limb?

My observations lead me to adopt this latter opinion, as that which best agrees with the principles of a sound physiology.

Beside, I have never been able to verify after death in those subjects in whom this spontaneous luxation had been recognised, the pretended displacement of the head of the femur, produced, as authors have affirmed, by the swelling and successive thickening of the cartilages within the cavity of the acetabulum, which expels the head of the bone by degrees, and accomplishes at length a complete luxation. If it ever is met with under these circumstances, we may safely affirm that the luxation has been accidental; that is to say, produced by some external cause, which may be unknown even to the patient.

The cartilages of the joints, as I expect to demonstrate hereafter, are not susceptible of any of the alterations peculiar to the organized parts; and, far from acquiring thickness, or any increase of bulk, they easily dissolve, are reduced into small friable portions, more or less pulverulent, and which allow themselves easily to be absorbed by the lymphatics in such a manner as to disappear altogether. This is what I have constantly observed in the dissection of the bodies of those who have died of this disease of the joint. This cartilaginous substance being no longer secreted by the osseous vessels of the extremities of the bones which it covers, its molecules become disunited, go into decomposition, and disappear by the effect of absorption, which already reduces the length of the femur, and by the same cause the shortness of the limb is produced: the osseous vessels themselves subside, acquire a degree of density, and are reduced, which assists the shortening: all this may, and does take place without any serious accidents, such as inflammation, suppuration, abscesses, and hectic fever. We find in fact frequently the osseous portions of the joints affected with disease for a long time, and entirely deprived of their cartilages, without being deprived, during the lifetime of the patient, of the motion proper to the joint. I am in possession of several portions of bone of this descrip-

tion, and a great number may be met with in the anatomical cabinets: but a very interesting example, which I shall relate, proves that the cartilaginous substance and the osseous principle may disappear and be re-established, without producing any of the serious accidents which often supervene in diseases of the joints, especially when left to the resources of nature alone.

Amongst the curious pieces of anatomy which I saw in the cabinet of the university of Vienna, Professor Prokaska pointed out to me a thorax dissected, in which was seen the head of the right humerus, engaged between the second and third of the true ribs, forming a projection of the whole of its orb into the cavity of the chest. This singular transposition of the bone had been the consequence of an accidental luxation which the patient had sustained in falling from a height upon the elbow, the arm being extended, and at a distance from the body. The head of the humerus, after having lacerated the capsular ligament of the joint, had been pushed with violence into the cavity of the axilla, under the pectoral muscles, in such a manner as to separate the two corresponding ribs, and pass into the space between them, the whole head of the bone penetrating into the thoracic cavity, and pushing before it the corresponding portion of the pleura. Every effort and invention was tried in vain to reduce this singular luxation. Some symptoms of a serious nature succeeded, which were relieved by bleedings, warm baths, and cooling drinks: but the arm continued at a distance from the body, in the same state of dislocation as at first, to which the patient by degrees began to be reconciled, and after several years of inconvenience and suffering, it ceased to be any longer troublesome to him. He was sixteen or seventeen years of age when the accident occurred, and lived to the age of thirty-one, when he died of some disease totally unconnected with the accident. The medical men wished to know the true nature of this singular luxation, of which they could before only judge imperfectly: they were not a little astonished to find the head

of the humerus engaged in the chest, enveloped in the pleura; and strongly wedged by its neck between the two ribs as above stated. They were still more surprised however, when instead of a hard ball covered with cartilage, they found only a round membranaceous body extremely soft, and yielding to the slightest pressure of the finger. The cartilage and osseous substance of the whole portion of the humerus contained within the cavity of the chest, had entirely disappeared: the absorbents had seized upon it, and, as so many faithful guardians, they had endeavoured to destroy by piece-meal an enemy which had furtively introduced itself into an abode where its presence must necessarily be painful and hurtful, and which they were not able to expel in mass. There remained no more of the humerus than the membranous rudiments of its osseous head; and even these rudiments, in my opinion, belonged in a great degree to the *pleura costalis*.

Case 1. The first subject I saw cured of a *tabes dorsalis*, accompanied with an abscess by congestion, was one of our surgeons of the second class in the army of the East, M. Bernard, aged twenty-seven years, of a delicate constitution. This young man during the blockade of Alexandria in 1801, after having experienced for some time pains in the back and in the breast, felt all at once a weakness in the lumbar region, which obliged him to discontinue his duty in the hospital. The prostration of strength soon became general; and on the 15th day, this surgeon applying his hand mechanically to the loins, felt there a tumor about the size of a hen's egg. He was then in that great degree of weakness that he could not quit his bed. Being called upon to give my advice, I recognised all the symptoms of an abscess by congestion. I ordered him at once into the hospital for the reception of officers, where I applied several moxas near the tumor. The fifth application was followed by an improvement so evident, that the patient was able immediately afterwards to take several turns round the room. I ordered for him such kind of diet as circumstances would

then permit, with the use of tonics and opium. The application of the moxa was continued during eight days, at the end of which time I was obliged to transfer the treatment of the patient to the principal surgeon of the hospital. The number of general officers we then had wounded did not allow me to see him again till two months afterwards. The tumor had then increased in size and changed its shape; the patient was tormented by an obstinate costiveness, and sometimes likewise by an impossibility of passing urine.

Having determined on the opening of the abscess, I applied upon its most prominent point a piece of concrete potash, the effect of which was rendered null by the movements the patient made during the night, which deranged all the dressings. The next day I plunged into the tumor the point of a red hot iron having cutting edges: there came out a serous kind of matter of a dark gray colour, mixed towards the end with small white clots. I persisted in the use of the bark and bitters: these means, assisted by a good diet, procured a cessation of the fever, and the strength of the patient returned readily. In the second month there issued nothing from the opening but a very small quantity of a yellowish serosity, which dried up a fornight afterwards during the patient's passage to France. The cicatrix remained of a purplish colour for three years afterwards, and was always painful on the changes of weather; but a regular diet and careful nursing have restored M. Bernard to a state of perfect health, so that he preserves nothing at present of the disease but the remembrance of it.

Case 2. Anglaret, a chasseur, was admitted to the hospital of the guards, with all the symptoms of a caries of the fourth or fifth dorsal vertebra, which projected: the patient remained constantly curved. The local pains, and an abscess of the size of a Guinea fowl's egg, situated near the inferior angle of the scapula, left no doubt as to the existence of the caries. I immediately submitted it to the general treatment we have described; nine moxas were

successively applied upon the seat of the disease. The tumor became stationary; it even appeared to be a little reduced: I immediately determined to pass a sharp hot iron through it: directly after I applied the dry cupping glasses in order to absorb all the matter, and administered to the patient bark, opium, and antiscorbutic remedies. Notwithstanding the very advanced state of this disease, the symptoms subsided by degrees, and disappeared entirely: the abscess became cleansed, and the cicatrix of the two openings took place at the end of a few months. This chasseur at last regained his health, but was unable to continue in the service, as he remained curved and extremely weak.

CASE 3. Zwart Villhem, a lancer of the 2d regiment, about twenty-two years of age, of a weakly constitution, and subject from his infancy to wandering pains in both shoulders, was sent from the fever to the surgical ward. At my morning visit, I examined this young man, and perceived at once that he was affected with the *tabes dorsalis*, or the gibbosity of Pott, a disease which this author has so well described. It was characterised by the relaxation of the interspinous ligaments, by a great weakness of the whole vertebral column, by the considerable projection of the sixth vertebra of the back, by the patient lying on the right side, and the habitual bending of the thighs towards the pelvis, a position which was become indispensable to him, to avoid otherwise continual suffering, and to procure sleep; the patient in fine walked with the back curved, and could scarcely support himself on the lower extremities. A seton had been passed through the skin below the diseased vertebra.

I suppressed the seton, and began by applying a moxa upon the course of the vertebral column: this method was continued for some time, and every second day fresh cylinders of cotton were burnt upon the diseased vertebra, and round about the tumor. Internally I administered tonics, such as bark, opium, and good wine. These means

procured a sensible amelioration in the health of the patient, and on the thirtieth day he was able to walk a part of the day without being obliged as before to sit or lie down. He recovered insensibly his strength; the projection of the spinous apophysis by degrees disappeared; and a few more moxas applied along the vertebral column, caused the weakness which still existed to disappear, and brought about the cure, which was completed the third month from his admittance into the hospital.

CASE 4. A young lady, Mademoiselle A****, whom I have had occasion to attend in town, was attacked with the same disease, which presented the same symptoms as in the lancer just mentioned. She was conducted to a perfect cure by the application of fifteen moxas upon the vertebral column, and by the use of a depurative syrup, with the addition of opium: she was also equally threatened with *phthisis pulmonalis*. Some physicians who were consulted for this patient, had already affirmed that it would terminate fatally. An issue established on the left arm; antiscorbutic medicines, iceland moss, asses' milk, and a good diet, completely re-established the health of this young lady.

CASE 5. I shall include likewise, as an example of the cure of abscess by congestion, complicated with caries of the vertebræ, the case of a young fusilier, Jacques Antoine Boybellaud, whom we have at this moment under our eyes in the hospital of the guards, where he entered the 12th of July, 1811, having on the lumbar region a tumor the size of the fist, accompanied with all the symptoms of an abscess by congestion, and of a caries in one of the neighbouring dorsal or lumbar vertebræ, produced by excessive *onanism* and by the impression arising from the humidity he had to encounter during the two last campaigns. Although the disease was arrived at its greatest height, and held out scarcely a hope of cure, I lost no time in employing the treatment which had succeeded so well with me in the foregoing cases. The fluctuation of the abscess was

sensible at all points; the skin at the inferior and most depending point, was extremely thin and ready to burst. The patient was deprived of every kind of motion, and kept himself in his bed, with the body and lower extremities continually bent. The weakness was extreme, and the slow suppurative fever, which accompanies the *tabes dorsalis*, was distinguished by its slight exacerbations towards night, by glutinous sweats of a disagreeable smell, by watchfulness, and by the state of the pulse.

I put the patient on the use of bark and opium, taken in various ways, and I applied, with the interval of one or two days, ten moxas on the course of the vertebræ, and towards the base of the tumor. The stationary situation of the patient, the strength which he acquired from the tenth moxa, and the desire which he himself testified to have the abscess opened, which, by the bye, began to recede spontaneously, induced me to perform the following operation:—

After having heated to whiteness a blade of steel, terminated by a point, a little enlarged towards its base, and sharp on its two sides, I laid open with it the whole diameter of the abscess from one side to the other, beginning at the most elevated, and descending obliquely to the most depending part, where nature was preparing an opening. This operation was performed without causing scarcely any pain. A whitish serous matter mixed with white, thick, albuminous clots, flowed in great abundance; but, that as little as possible might be left in the abscess, I applied several times dry cupping glasses, by which means the whole abscess was emptied. On the scite of the abscess there remained a deep excavation. Not wishing to introduce any probe into the opening, I judged by the touch that the seat of the caries was in the first lumbar vertebra. A compress with openings left in it, and dipped in oil of chamomile strongly camphorated and very hot, was applied immediately over the wound, with dossils of lint, and a bandage slightly compressive. A theriacal draught with æther was administered to him; and I prescribed for him some good

broth with Bourdeaux wine, and two grains of opium for the night, to be taken in two ounces of hot wine sugared.

Every thing in the nature of things made me fear whether this operation had not hastened the fatal termination of the disease; however, to my great surprise, I found him better the next day at my morning visit; he had slept some hours, and the fever was less.

During the first few days the discharge was very copious; but it was reduced by degrees, and the other symptoms abated. The eschars of the cautery and of the moxas became detached; considerable albuminous flakes came out of the abscess, the sides of which subsided, retracted, and began to grow together. We have at two different times given a slight emetic; and we have never relinquished the use of the bark, opium, generous diet and good wine. This young patient, at the moment we are reporting this case, is in the thirty-first day from the operation. His wounds are in excellent condition; are furnishing a suppuration not too abundant, white, and of a good consistence. Several of the wounds of the moxas are cicatrized; his strength is in a great measure restored; his appetite and sleep returned. The patient lies straight out in the bed, and is able to rise. Should no unexpected and unforeseen event take place, he is in a fair way of obtaining a perfect cure.

Case 6. As the disease of the two following cases has some relation to the foregoing, although arising from different causes, we shall report them here.

Honoré Desplan, fusilier of the imperial guard, received at the battle of Wagram a contusion from a spent ball, which grazed the back, destroying a part of the clothes, and effected an incomplete luxation of the tenth dorsal vertebra, in such a manner that the spinous process of this vertebra projected about nine lines. The two corresponding vertebræ were evidently more depressed than the others. This soldier passed several months in the hospital of the guards after his return from the Austrian campaign. He suffered

a great deal, and it was difficult for him to find a position that was supportable. By degrees the parts accustomed themselves to this state of things, and acquired strength: Desplan now walks with ease, having nevertheless the back bent: he only feels some slight pains on the changes of weather.

Case 7. François Moilleseaux, voltigeur of the first regiment of the guards, twenty-three years of age, furnished an example similar to the preceding. The incomplete luxation which took place of the eleventh vertebra of the back, was produced by a fall from a precipice in Spain. The patient walks with his back bent; but the almost continual pains which he experiences, have brought on a degree of leanness and emaciation. A very singular phenomenon exhibited by this soldier, is an itching, accompanied with an agreeable sensation in the genitals, whenever he attempts to stretch himself out in bed.

Case 8. Charles Stoll, of the artillery of the guard, aged twenty-six years, was received into the hospital for a rheumatic affection contracted in Spain, after many fatigues and bivouacs. This disease, which occupied the left thigh, and the pains of which were principally felt in the knee, was combated by cuppings and scarifications, blisters, and the moxa. All these means, however, could not prevent an apparent spontaneous luxation of the head of the femur; which was announced by the consequent shortening of the limb, the impossibility of moving it, the local pain, and turning of the foot outwards.

The patient soon after experienced very severe pains, the consequence of this affection, which, acting on the general system of life, determined a quotidian sympathetic fever. Tonics, bark, and bitters were administered to him. In spite of these means Stoll fell into a marasmus: a purulent discharge of the ears took place: frequent cough succeeded with mucous expectoration; hectic fever came on with its usual symptoms. A blister applied to the leg of the diseased side appeared to suspend the symptoms during a week;

but they soon returned with increased violence. In short, this unfortunate patient, after having been a prey to the most severe tortures, fell all at once into a state of imminent suffocation. His face lost its colour; the pulse became small and vermicular; the respiration difficult and stertorous; the animal life preserved itself untouched to the last gasp; and the unfortunate Stoll, while still dying, expressed by plaintive cries the trying situation he was in during his short and painful agony.

The dissection of the body shewed us an abscess at the hip-joint, filled with a serous matter, mixed with whitish flakes, and abrasions of the cartilage. The head of the femur was worn down by a kind of caries, and in the centre of the osseous edge of the *acetabulum* was an opening which communicated with the cavity of the pelvis.

Case 9. Nicolas Martin, gunner of the guard, was admitted to the hospital for a deep and fistulous wound in the superior and interior part of the left thigh. After having examined him at my morning visit, I perceived that there escaped from the wound, the depth of which I could not ascertain, a tolerable quantity of matter. The patient suffered much about the hip-joint, and especially at the knee. The leg was habitually bent down upon the thigh, and the thigh upon the pelvis. By these signs I recognised the spontaneous luxation of the head of the femur, and the existence of an abscess round the joint; but the patient being already in a state of marasmus, I was obliged to confine myself to some internal prescriptions, in order to keep up the powers of life, which soon abandoned him altogether. He died at the expiration of a month. The opening of his body discovered the same derangement as in the preceding case. The acetabulum was perforated, and the matter filled a part of the pelvis.

Case 10. ——— Frank, fusilier of the guards, was admitted to the hospital for a rheumatic pain which he felt for three months in the left thigh. After observing him attentively some days, I recognised all the symptoms of a

peculiar action going on in the hip-joint, and soon after those of a luxation of the os femur, or rather a wearing away of the cartilage of the head of that bone, and probably too of the acetabulum. I employed instantly the most active means, such as cupping with scarifications, blisters and the moxa, which was several times repeated, and I succeeded in preventing the formation of the abscess. The pains, which were at first very severe, subsided gradually; and the parts becoming habituated to this change of things, the patient recovered his strength and healthful appearance, so that at the end of six months he was discharged from the hospital, retaining only the lameness and deformity inseparable from such an affection.

Memoir on the Moveable and Preternatural Cartilages of the Joints.

The first well-attested case we have of the formation of this moveable cartilaginous body in the joints, is reported by Ambrose Parè, in 1558. This illustrious surgeon in making the opening of an abscess of the knee, observed a white, hard, polished concretion about the size of an almond, pass out by the opening. In the next century, Monro, Simpson, Bromfield, Cruikshank, Theden, Morgagni, and Bell, extracted similar extraneous bodies from the knee-joint with success. These concretions were generally believed to be peculiar to the knee joint, but they have been discovered in the articulation of the jaw and of the foot.

The uniformity of the symptoms accompanying these extraneous concretions, proves that their formation depends always on the same cause: medical men however are not agreed as to the cause which produces them; some have been of opinion, that they originate in the synovial membrane; others, in the fatty and vascular tissue observed in the posterior slope of the condyles of the femur, which

they think may be detached by a blow more or less violent: others again believe, which is the most generally received opinion, that it is the synovia which becomes inspissated, in more or less quantity, towards the depending points of the joint, in such manner as to form these concretions, the growth of which is gradual. These same writers all agree as to the diagnosis of this affection, and most as to the method of performing the operation: they all wisely recommend avoiding the parallelism of the incision of the skin with that of the capsular ligament of the joint, to secure the interior of the articulation from the contact of the air.

So long as these concretions remain very small and soft, they produce little inconvenience; but as soon as they have acquired a certain bulk, they greatly hinder progression, and produce a sympathetic irritation of the system, which even threatens life.

In order to get rid of these symptoms, and prevent the most unfortunate consequences, it is indispensably necessary to extract these bodies, now become extraneous and hurtful. Those who have had occasion to perform this operation have effected it in two different methods, either by cutting down at once through the soft parts upon the cartilage, and extracting it the shortest way, or by making the incision in such a manner, that the opening in the integuments shall not be parallel to that of the capsular ligament.

Bromfield and Hunter were the first who practised this latter method, which has been since followed, and was brought to perfection by Desault. His plan is to retract forcibly the skin towards the opposite point to that where the incision of the capsular ligament is to be made: he afterwards unites the edges of the wound exactly, and retains them by strips of adhesive plaster. But this exact union is not without its inconveniencies. The strong pressure of the plasters, and of the retaining bandage upon the joint, produces sometimes irritation and inflammation of the parts: it requires therefore to be made with great

caution; and the bandage should be so applied as not to make too much pressure upon the joint.

CASE 1. Jacques Antoine Merlin, twenty-four years of age, fusilier, was admitted to the hospital of the imperial guard for the cure of a sharp pain which he had felt for a long time in the left knee. He was afflicted at the same time with an intermittent fever of an irregular type.

At the first examination I discovered the existence of a hard moveable body playing in the joint of the knee. There could be no doubt that it was a cartilaginous concretion, and I should have operated upon it immediately if the ill health of the patient had not presented an obstacle to it. It was necessary first to attend to the febrile affection, and restore the health of the patient. This was accomplished by suitable remedies, and at the end of twenty days, he was in a situation to undergo the operation. In order to secure to the operation all the success I hoped for from it, I performed it with such precaution, that the incision of the integuments was found to be at a very great distance from the joint. Consequently, after having placed the limb in a state of perfect extension, I pushed the cartilage from the internal side of the knee, where it then was, to the opposite side. Its passage under the patella was effected without any pain. I then laid hold of this extraneous body with my fingers, and pressing it strongly upwards and outwards, I caused it to project out under the *vastus externus* muscle at more than three fingers breadth above the joint. The capsular ligament likewise accompanied it. After having fixed it at this point, I cut through the skin, and part of the muscle which covered it, and afterwards through the capsular ligament, and in a moment it was expelled through the opening. Without attempting to unite the wound, I applied a very simple dressing, taking care to soak the compresses that were intended to envelop the knee in camphorated wine, (an excellent method to prevent pain and inflammation.) No accident of any kind supervened,

and the wound was perfectly cicatrized the twenty-fifth day, which would have occurred much sooner if the patient had been in better health.

The cartilaginous substance extracted was about the size of an almond; it was white, wrinkled on one side, and having a polished surface on the other. The analysis of it made by M. Vauquelin, proves, that this concretion differs in hardly any thing from common cartilage: it proves likewise that the substance of the cartilage is formed of albumine and mucus become concrete, since these two substances act in the same manner as cartilage itself with water, and with the diluted acids.

CASE 2. Berens, a grenadier of the imperial guard, was received into the hospital for the cure of a very severe pain which he had felt in the left knee for several years. Sometimes he was stopped suddenly when walking, by the passage from one side to the other of the knee of a hard body which he said he could feel at the joint. In short, on the first examination, I found two moveable cartilaginous bodies, each the size of an almond: their mobility was so great, that at the least touch they escaped from the pressure of the finger, and concealed themselves immediately within the joint. In order to succeed in the extraction of them, I was obliged to hold them with one hand and operate with the other. In consequence of this difficulty, this operation was more tedious than the other, but the result was nevertheless the same. The two cartilages being extracted, the lips of the wound were brought together by sticking plasters. The cicatrix was accomplished by the ninth day, and the patient experienced no further obstacle to the motion of his limb.

MEMOIR ON AMPUTATIONS.

After the battle of Fontenoy, the Royal Academy of Surgery proposed to determine the cases of gun-shot wounds where immediate amputation was necessary, and those in which it is convenient to defer it. This question could not be resolved in a satisfactory manner, except by surgeons who had practised on the field of battle, and in the military hospitals; and the academy notified publicly, that no other candidates would be allowed, for which reason the prize was refused to Le Comte, because his doctrine was not supported by practice. The prize was adjudged to *Faure*, but all practitioners have not adopted the principles of that author. We ought to have only one opinion on this subject, now that twenty years of continual wars have carried our art to the highest point of perfection. It is after having directed uninterruptedly, during this long period, the service of health in quality of surgeon-in-chief and inspector-general to the armies, that I now step forward to discuss the different opinions proposed to the academy, and offer myself to dissolve definitively this great question, which I regard as the most important of military surgery.

If we are told that the amputation of a limb is a cruel operation, dangerous in its consequences, and at all times unfortunate for the wounded man, whom it puts in a state of mutilation, and that consequently there is more honour in preserving a limb, than in amputating it with dexterity and success, I should reply triumphantly, by establishing the maxim, " that amputation is an operation of necessity, which offers a chance of happiness to the unfortunate patient, whose death appears certain under any other treat-

ment; and that wherever a doubt exists of its indispensable necessity to the safety of the patient, it is deferred until nature shall decide definitively, and present a positive indication." We have even a right to add, that the chance of success is much greater at this day, than at the period of the *programme* of the academy. In short, Faure tells us, that out of about three hundred amputations performed after the battle of Fontenoy, about thirty only were followed with success, whilst at the same time we have saved more than three-fourths of our amputations, of which several have lost two limbs. We attribute this superiority, 1st, to our knowing better how to lay hold of the indication and the propitious moment for amputating; 2dly, to a more methodical mode of dressing; 3dly, to a method of operating more simple, less painful, and more prompt than that in use before our time.

Of Primitive Amputation.

When a limb which has received a gun-shot wound cannot be preserved, it must be amputated immediately. The first twenty-four hours are the only hours of calm which nature enjoys, and which we must hasten to take advantage of, as in all dangerous diseases, to administer the necessary remedy.

In the armies, many circumstances beside cause the urgency of amputation to be experienced; 1st, the inconvenience of transporting the wounded from the field of battle to the military hospitals in carriages badly hung, the jolting of which would produce such a derangement in the wound and in the whole system, that the greatest number would perish during the passage, especially if it were long, and if the heat or cold were extreme.

2dly, The danger of a long continuance in the hospitals, a danger which the amputation greatly diminishes by con-

verting a gun-shot wound into a wound susceptible of a speedy cure, and by reducing the causes of the production of fever, and of the hospital gangrene.

3dly, The case where the wounded are obliged to be abandoned. It becomes then of importance to have performed the amputation, because, when the operation is once performed, the patients may remain several days without dressing, and the dressings afterwards will be the easier. Beside, it often enough happens that these unfortunate men would not find surgeons sufficiently skilful to operate upon them, which we have witnessed amongst certain nations, whose corps of ambulance are not composed like our's.

Cases in which Amputation ought to be immediately performed.

First Case. A limb carried away by a shot, splinter, or shell, demands the most prompt amputation: the least delay puts the patient's life in danger.

The skin in this case has been strongly distended and lacerated; the muscles have been unequally torn and carried away; the tendons, the aponeuroses torn out and lacerated; the nerves and blood-vessels cut and strongly drawn out; lastly, the bones shivered and crushed to a greater or less distance. These first effects are followed by a general or partial commotion, by stupor in the injured part, and throughout a great extent of the limb thus carried off; by a painful trembling in the same limb, which incommodes the patient in an extraordinary manner; by a local fulness preceding the state of irritation and tension which soon manifests itself. Hæmorrhage, an accident much more to be dreaded than is generally imagined, often comes on a few moments after the wound, and would terminate the existence of the patient if the most speedy suc-

cour was not administered. I can safely affirm, that without the activity of the *mounted ambulance*, who have always dressed the wounded on the field of battle, a great number would have lost their lives through this accident alone.

If the operation is not speedily performed, pain makes its attack; a fever is kindled; the functions are deranged; the irritation afterwards increases; and convulsive motions take place. If the patient does not sink under these first symptoms, the solids, after having been distended beyond measure, fall into a state of complete atony, which produces gangrene in the stump, the fatal consequences of which it is difficult to prevent.

It is very easy to conceive, after this short exposition of the matter, that amputation in this case ought to be performed immediately: to defer it, and content ourselves with the application of simple dressings, would be to wait quietly for the symptoms which I have been speaking of.

At Strasburgh, during the bombardment of Fort-Kell, in 1793, three volunteers had, one an arm, another a fore-arm, and a third a leg carried away by the pieces of the shells: they were carried to the hospital of wounded men of that town, under the direction of M. Boy, surgeon of the first class. They were trifled with several days before performing the amputation. Not one had the good fortune to escape.

At Mayence, during the retreat from Frankfort, several of the wounded who had their limbs carried away, were not amputated till some time after, and not one of them were saved.

At Nice, during the taking of Saourzio, two amputations were performed in the hospital, No. 2, nine or ten days from the wound, one of the arm, the other of the fore-arm: both died.

At Perpignan, at the hospital Brutus, I visited on my arrival two soldiers on whom amputation had been performed seven or eight days after the wounds they had received on the 14th of July, 1794. The first had a leg

carried away, the other had lost his right arm. Notwithstanding all my exertions I could not save their lives. One died of tetanus; the other of gangrene.

In the month of August, 1805, two gunners of the guard in firing a salute of artillery, had each one a hand carried away, and the anterior surface of the body burnt. They were just in the act of ramming home the wad, when the explosion accidentally took place, from the carelessness of the man charged with the match. The right-hand of one of the gunners was completely blown off at the wrist, and projected more than two hundred paces. The left-hand of the other gunner was torn off with the fore-arm at the elbow-joint, and was likewise thrown to a great distance. As I chanced to be in the hospital when these two wounded men were brought in, I operated upon them immediately. In one the amputation was performed at the wrist; and in the other at the inferior part of the arm. The two operations were followed with the most complete success, although the burnings of the face and breast in both were severe and extensive.

Second Case. When a body propelled by gunpowder, strikes a limb in such a manner that the bones are crushed, the soft parts greatly contused, lacerated, and carried away to some depth, amputation ought immediately to take place: without it all the parts disorganized will be in a short time attacked with gangrene; besides, the symptoms produced in the former instance, will take place here too.

Third Case. If the same body should carry away a great portion of the soft parts, and the principal vessels of a limb, of the thigh, for instance, without fracturing the bone, it would place the patient in a situation to be operated upon immediately; for, beside the accidents which would result from so great a loss of substance, the limb would be deprived of life, and fall necessarily into a state of sphacelus.

Fourth Case. A grape shot of a large size strikes the thick part of a limb, crushes the bone, cuts and lacerates the muscles, destroys the great nerves, yet nevertheless

leaves the principal artery unhurt; this will be a fourth case for immediate amputation: it is rendered necessary on account of the laceration of the limb, and the commotion produced throughout its whole extent.

Fifth Case. If a spent ball, leaping along the ground should strike obliquely a limb, without producing any solution of continuity in the skin, as often happens, the parts which make a resistance to its action, such as the bones, muscles, tendons, aponeuroses and vessels, may be ruptured and torn. The extent of the internal mischief should be examined into; and if, through the soft parts, the bones are found to be crushed; if there is a suspicion that the vessels are lacerated, which is known by the swelling and a sort of fluctuation, amputation ought immediately to take place. But sometimes the vessels and bones are spared, and the muscles are almost the only parts disorganized. In that case, an incision should be made in the skin, according to the advice of M. Lamartiniere; by which means we shall give an exit to some black grumous blood, and must wait the event. This incision is equally necessary in the first instance previous to amputation, in order to ascertain the extent of the injury of the parts.

It is in consequence of such a commotion on the internal organs, that the death of a great number of persons takes place; which has been for a long time believed to be the effect of the commotion produced in the air by the passage of a ball, which grazing different parts of the body, produces some change in them, or cuts through the column of air, which ought to serve for respiration, just at the moment when it is introduced into the chest.

Although this opinion has been supported by surgeons of great reputation, and by a great number of philosophers, we may easily convince ourselves of its falsity, by attentively considering, 1st, the direction and progress of solid and hard bodies, and their relation with the aërial fluids through which they are made to pass; 2dly, the internal

derangement perceived in the dead bodies of those whose death has been attributed to the impression of the air only, put in motion by the ball; 3dly, the properties of elastic substances, such as the integuments, the cellular tissue, &c. when touched by a ball.

All natural philosophers agree, that a solid body, put in motion in a fluid, acts only upon a column of that fluid, the base of which is about equal to the surface which the solid body presents. So a cannon ball flying through a space equal to its diameter, can only displace a portion of air in the proportion of three to two compared to the bulk of the ball. This fluid by reason of its divisibility, and being homogeneous with the circumambient air, divides, and separates, and becomes confounded with the whole mass of the atmosphere. The effects of this aërial substance are null, and there cannot exist the least doubt, but that if the slightest solution of continuity takes place, it depends only on the action of the ball.

Besides, if we consider the velocity of these bodies, which are known to diminish in an inverse proportion to the squares of their distances, we shall perceive that the space through which the ball has passed before reaching the object towards which it is directed, will have already greatly weakened its velocity, and, by the strongest reason, destroyed altogether that of the column of air which precedes it.

Those philosophers who support the contrary opinion, depend on a particular experiment, of which I will endeavour to give a succinct idea.

They project, by means of an air gun, a ball into a mass of soft clay, placed upon a deal plank at two-thirds of the the range of the projectile. Instead of a hole of a caliber equal to the ball, there is hollowed out in the soft clay a kind of crater of a diameter two or three times greater, and of an oval shape, which the philosophers place to the account of the air whirled along with the ball, and which it

gets rid of at the moment it passes into this mass, in such manner that the molecules of the clay are separated in all directions, and leave a relative excavation.

But is it not more probable, that this phenomenon is rather owing to the obliquity which the ball experiences in the two lines which it runs through, in entering and coming out of this soft unelastic substance? For in the first instance the ball has commenced its parabola; and, at its return, the new movement which the board imprints upon it by its resistance and elasticity, turns this body from its first line, and obliges it to follow a different direction: it is to these two angles, more or less extended of incidence and reflection, that the separation of the molecules of clay, in my opinion, is owing, increased, by the instantaneous spring of the point of the board which has been struck by the ball: and these argillaceous molecules subside the more easily, as they are deprived of the elastic property.

The different movements which a ball experiences in its course, and the elasticity of the skin, will explain to us now by what means those internal injuries happen without any external solution of continuity, and frequently even without ecchymosis. The ball moves through a given space in the rectilinear direction imparted to it by the power which propelled it. If at this instant it should meet with any part of the body, it would carry it off in an extent proportioned to its bulk; but the ball, after having run through a certain distance, experiences by the resistance of the air and attraction of the earth, a deranged movement, which makes it turn on its axis in a diagonal direction.

When it approaches the end of its course, if it should chance to encounter any part of the body of a rounded shape, it runs over a great part of its circumference in consequence of its curvilinear motion. It is likewise in this manner that the wheel of a carriage acts when it passes obliquely over the thigh or leg of a person lying upon the ground: in this case the consequences are the same as those we have just spoken of. Those parts that are most elastic

yield to the bruising body, and those which offer resistance, such as the bones, tendons, muscles, and aponeuroses, are fractured, ruptured, and torn. By the same cause too it sometimes happens that the viscera are lacerated.

At first sight all the parts appear to be perfectly sound, but an attentive examination will not long leave a doubt of the internal mischief. The ecchymosis in this case does not shew itself externally, because the vessels communicating between the skin and the internal parts have been ruptured; because the effusion of blood naturally takes place into the deep excavations resulting from the rupture of the muscles and others parts; and because it has not the means of penetrating the texture of the skin. This effusion of blood can only be ascertained by the touch.

Experience comes in to the support of this reasoning. How often have we seen the ball carry away with impunity the helmet, the hat, the cartridge-box of the soldier, or other parts of his clothes? The ball carries away his arm, closed frequently with the body of his comrade, who experiences not the slightest harm. It passes even between the thighs of the soldier, and these limbs just discover an ecchymosis on the parts thus slightly touched, the only case in which it forms. Under other circumstances it separates the arm from the trunk, and the functions of the organs of the chest are uninjured.

M. Meget, a captain, marching in front of a square in the fort, at the battle of Altzey, fought on the 30th of March, 1793, had the right leg almost entirely carried away by a ball of large caliber, whilst that of his lieutenant, with which it was as it were locked, did not experience the slightest effect. The general shock, which was very great, and the severe cold of the season, brought the captain into a state of considerable danger. The amputation of the thigh, which was immediately put in execution, stopped the progress of these accidents. M. Meget was in consequence fit to be removed to the hospital at Landau, at a distance of about fifteen leagues from the field of battle,

where his cure was completed. I shall refrain here from recapitulating many other amputations similar to this, performed under the same circumstances.

M. Buffy, captain of artillery, in the army of the Rhine, was struck by a piece of a shell, which disorganized the right fore-arm, and grazed his head so close, that the front corner of his hat was cut through to the crown. This officer, although his nose was grazed, did not lose his senses, and had even the courage to command his company for several minutes: he was however conducted to my ambulance, where I amputated his arm, of which he recovered by the thirtieth day.

The musket balls, when they strike the body obliquely, produce in miniature the effects resulting from the incomplete shock of a cannon ball; so likewise the curvatures they form in the thick parts of the limbs are astonishing for their variety.

But to return to my subject. I am of opinion that the case we were speaking of requires immediate amputation; the smallest delay compromises the life of the patient. The internal mischief, as I said, is perceived by the touch, by the want of movement, and the little sensibility which remains in the parts thus struck; and, lastly, by the incision which we have recommended to be made.

In order to support this principle which I advance against the opinion of a great many authors, I shall indulge in a digression.

At the siege of Roses, there were brought from the trenches to the ambulance that I had established at the village of Palau, two gunners having nearly the same kind of wound: they had been struck by a ball of large caliber, which, when nearly spent, had grazed posteriorly their two shoulders. In the first, I discovered a slight ecchymosis over the whole posterior part of the trunk, without any apparent solution of continuity. He was hardly able to breathe, and spit up a great quantity of vermilion and frothy blood. The pulse was small and intermitting, and

the extremities cold: in short, he died an hour after the accident, as I had prognosticated. I opened the body in presence of M. Dubois, inspector of military hospitals. The skin was unhurt; the muscles, the aponeuroses, the nerves, and vessels of the shoulder were broken and torn, the scapulæ fractured, the spinous processes of the corresponding vertebræ of the back and the posterior extremities of the neighbouring ribs fractured; the spinal marrow was distended, the parenchyma of the lungs towards the corresponding points were lacerated, and a considerable effusion had taken place into both cavities of the thorax.

The second gunner died with the same symptoms three quarters of an hour after his entrance into the hospital. On opening the body the same mischief was perceived as in the first.

In the armies of Germany several similar cases presented themselves to my observation; and the most exact researches have constantly convinced me of the immediate action of the ball propelled by gunpowder.

Sixth Case. When a piece of a shell, as plinter, or a ball, have fractured the articular extremities, especially those forming the joint of the foot or knee, and that the ligaments of the joint have been burst or lacerated, immediate amputation is indispensably necessary. The same indication would present itself if the foreign body was lodged in the thick part of one of the articular extremities, or wedged into the joint in such a manner as not to be extracted by the simple and ordinary means.

It is only by these means that we can save the patient from those violent pains which constantly succeed to fractures of the great joints, from spasms, convulsions, acute fever, tension, and inflammation of the whole limb; but if we do not listen to the voice of experience, and put off the moment of amputation, the parts become quickly disorganized, and the life of the patient is compromised.

It is then evident, that in these cases amputation ought to be performed within the first twelve, or at most four and

twenty hours, if we do not wish to see the patient perish of the consequence of delay: Faure himself professed this opinion in some kinds of wounds.

Seventh Case. If a large grape shot, a small canonball, or a piece of shell has denuded, in passing through the thick part of the limb, a great surface of bone, without fracturing it, although the soft parts appear to be spared, amputation is not the less indicated. In fact, the violent percussion which such a blow produces, has shook and disorganized all the parts; the medullary substance gives way; the vessels are dilacerated; the nerves distended beyond measure, and reduced to a state of torpor which will not admit of the circulation of the nervous fluid; the muscles have lost their elasticity, so that the circulation and sensibility are extinct. However, before deciding, it will be necessary to observe attentively the symptoms which characterize such an injury. This case can only be supposed to happen in the leg, where the bone is very superficial, and is only covered in its anterior part by the skin.

The following are the symptoms observed: the limb is insensible; the foot cold as ice; the bone partly laid bare; and if the examination is continued, it will be found denuded of the skin, and even of the periosteum to a great extent; the commotion is propagated to a great distance; the functions are deranged; all the secretions experience a degree of disturbance more or less sensible; the intellectual faculties remain suspended, and the circulation of the blood is slackened. The pulse is small and concentrated; the countenance is pale; the eyes dim and suffused with tears: in short, the patient finds himself in such a state of anxiety, that he cannot remain long in the same position, and begs to be eased of the limb which becomes troublesome from its weight, and which makes him feel excruciating pains in the knee-joint. Whenever all these characteristic symptoms occur at once, there can be no hesitation in performing the amputation instantly; for the leg would be attacked with gangrene the same day, and the patient would quickly sink

under it. The following instances will fully justify this opinion:—

M. Charles Henri Després, thirty-two years of age, a sub-lieutenant, received in the affairs of the 12th of September, 1793, in the forest of Beval, a wound from a three-pound shot, which passed through the right-leg. This shot having pierced the skin and the *gastrocnemii* muscles towards their inferior part, passed round the leg to the fore-part, and denuded the tibia of the skin, which was lacerated almost throughout its whole length. The fibula was crushed, and the tibia fractured near its condyles, without being displaced; motion and sensibility were abolished in the limb. The same shot had carried away the calf of the left leg. This last wound was at first methodically dressed, and I afterwards amputated the other above the knee. After my attendance on this officer for several weeks, he was removed to Weissembourg, being in a fair way of recovery.

At the siege of Roses, which we have already mentioned, a gunner was brought to me wounded by a grape-shot which had ploughed up the anterior part of the limb, running along in an oblique line, which extended from its internal and inferior side, near the *tendo achillis*, and about an inch from the ancle to the superior and exterior portion of the calf, in such manner that the skin covering the tibia anteriorly was entirely detached throughout its whole extent from the inferior to the superior extremity. The teguments of the calf were pierced by a very small opening compared to the bulk of the shot which had effected it; some portions of muscles were lacerated and contused; the bone was fractured but not displaced: the commotion had been so violent that the leg was almost totally disorganized; the foot was cold, the pulse small, &c.

I was desirous of performing the amputation immediately; but, having an opportunity of consulting one of my colleagues, a very able man, I lost no time in asking his advice. He was of opinion that the operation should not take place, being persuaded that he could preserve the limb

for this patient. I agreed relactantly to this decision; I confined myself however to the making a few incisions of the disorganized skin, and applying the apparatus for fracture soaked in salt-water. The critical situation in which we were placed at this moment, did not allow of my keeping this patient for the purpose of operating upon at a future period. I sent him to my friend, M. Ribes, surgeon of the first class, at the hospital of Figuieres, with a request that he would amputate as early as possible. He wished likewise in his turn to consult the principal medical officers of the army which were then at Figuieres. They were of opinion that it should be deferred. The same night however the whole leg became gangrenous, and the patient died next day.

A very similar case occurred to this young practitioner. The unfortunate end of the first subject induced him here to amputate immediately; but the same persons in consultation opposed it; and determined that it should be delayed till the first symptoms had subsided. The operation was in fact performed the day it was decided on, but it could not save the life of the patient.

After the battle of Eylau, I met with, in two officers of the imperial guard, two cases similar to the preceding. The repugnance which these two officers shewed to the operation, induced me to consult with one of the greatest practitioners in France, who was then present with the army: he likewise was of opinion that the operation might be deferred, judging that the limbs might be preserved by employing the treatment proper for compound fractures. In one of these officers gangrene made its appearance the third day, and he died on the eighth or ninth from the accident.

The second patient, after encountering great dangers produced by tension, deep suppuration, gangrenous affection, and the exfoliation of several pieces of bone, preserved his leg: but the foot remained in a state of atrophy;

destitute of all motion, and the leg itself presents a considerable curvature, with habitual fistulous ulcers, and a shortening somewhat considerable of the whole. This officer now greatly regrets not having the limb amputated.

Eighth Case. I shall add an eighth case which requires primitive amputation; that is, when one of the great *ginglymoid* articulations, such as the elbow, has been laid open by a cutting weapon to a great extent, with an effusion of blood into the joint. In these kind of wounds the synovial membranes, the ligaments, and the aponeuroses become inflamed as much by the imperfect division of them, or the laceration of these membranes, as by contact with the external air. Swelling and great tension of the part quickly make their appearance. In a short time violent pains come on, with abscesses, deep sinuses, caries, hectic fever and death. I have witnessed a great number of persons perish with these kind of wounds, because the operation has been postponed with the hope of saving the limb. I shall give some instances of it which have occurred to myself.

Joseph Grandi, grenadier, was brought to the hospital of the guard, on the second day from having received a sabre wound in the joint of the right knee. The weapon had divided the patella through its whole thickness, and entered the condyle of the femur. There was in the first instance a considerable hæmorrhage, which a surgeon of the village, who was called in, endeavoured to check by compression; a method by no means sufficient for the purpose, and which could not prevent the effusion of blood into the joint, and its extravasation into the neighbouring cellular membrane. As amputation could not now be undertaken, on account of the symptoms which had already made their appearance, this patient died in the end of an enormous collection of fluid produced by the effused blood, the bed of which extended over one-third of the thigh, at the inferior part, with complete disorganization of the soft parts, and denu-

dation of the *os femoris.* The cartilages were wholly destroyed, and caries had already taken place in the spongy substance of the articular portions of the bones.

Jean Lapaix, aged thirty years, grenadier of the imperial guard, received a wound from a sabre in the superior part of the right-knee. He travelled two leagues on foot to arrive at the hospital where I first inspected his wound. This wound, which was about an inch and half in length, took a direction from without obliquely inwards. The tendon of the *extensores* muscles of the leg was divided even with the patella, and the joint laid open: there flowed out an unctuous liquor of a reddish colour, which I easily recognised for the synovia. I did not hesitate a moment, seeing the danger of the wound, to propose immediate amputation before the appearance of the bad symptoms; but the patient refused to submit to it. Thus obliged to temporize, I brought together as well as possible the edges of the wound, to shelter the joint from the contact of the air, and prevent any bloody effusion. The means generally employed were put in practice, but they could not secure the patient from the symptoms which shortly made their appearance. The grenadier begged himself for the amputation of the limb, which was effected on the fifth day. A calm succeeded to the operation; a copious suppuration took place in the stump; and the situation of the patient promised a happy termination; when, on the fifteenth day, the suppuration was suppressed without any visible cause. All the means I employed to restore it were ineffectual; the patient was attacked with *ataxia*, and died on the second day.

I have witnessed many others die of similar wounds, because amputation had not been practised for want of courage.

When the wound is small, although it may penetrate deep into the joint, and there is no bloody effusion into its cavity, it is most commonly cured, provided too tight a compression is not made use of.

On what cause does this difference depend, since the air penetrates into the joint in one case as well as in the other? I shall allow myself here to present some reflections to the reader on this subject.

Amputation is not equally indicated, for wounds of the same kind, which injure the orbicular articulations, such as the shoulder or wrist. These wounds are without doubt accompanied by some serious symptoms, but they are much less so than those which happen to the former kind. I am not able to render a positive reason for this difference; I think, however, that the *ginglymoid* articulations being provided with a greater quantity of fibrous parts on their exterior, and the interior of these articulations receiving, without doubt, in the same proportion a greater abundance of the nervous filaments of nutritive life, they are more susceptible of irritation and inflammation; and for the same reason, those wounds which are of great extent, are more serious than those which are small; beside the shock which the parts have received is also more considerable.

If a wound which has injured two limbs at the same time be of such a nature as to require immediate amputation of both, there should be no fear of amputating them both at the same time without allowing any interval. We have often performed this double operation with as much success as the amputation of a single limb.

We shall confine ourselves here to reporting the instance of Pierre Mongrand, as being the most remarkable. This volunteer, twenty-seven years of age, was one of the first to enter a redoubt blown up by the enemy at the same moment. The face and hands of this soldier were burnt; the right-leg was carried away by a splinter of stone near the knee-joint. The left-leg was struck by the same blow, but without having the skin broken: so violent however had been the shock, that the whole of the limb was attacked with gangrene the same night.

I had performed an immediate amputation of the right-leg, and my brethren had engaged me to defer that of the left

on account of the apparent soundness of the limb. Nevertheless, the leg was cold, of a blackish colour, deprived of feeling and motion of every kind. We employed in vain all the means indicated: the next morning the sphacelus was completely formed. The alarming situation of the patient brought over my colleagues to my opinion, and it was determined that the amputation should instantly be undertaken. I immediately set about it, with the intention of cutting off this limb even with the other, for the sake of equilibrium.

The slow fever, which had already made its appearance, together with diarrhœa, watchfulness, and at intervals, delirium, left me but very little hope. I gave every attention to this patient; my visits were as frequent in the night as in the day, and I had the satisfaction to save his life and conduct him to a perfect cure.

If one limb is injured in two different places at the same time by two different wounds, and one of them requires amputation, (suppose for instance a wound of the leg with fracture of the bone, and a second in the thigh made by a ball, without fracture of the femur or any serious accident) the simple wound of the thigh should be first dressed, and the wounded leg immediately after amputated, admitting that the knee-joint remain unhurt.

We shall observe, however, that in cases where, at the moment of the wound, delirium, convulsions, and inflammation make their appearance, it will be necessary to defer the operation. In this case, we must have recourse to the means for relieving these symptoms: the motions of nature should be closely watched, and the first moment of calm taken advantage of for performing the operation.

Before passing to the solution of the second question, that of consecutive amputation, I shall make a short digression on the operation itself.

Amputation should be performed in the circular method, and at several times, in the continuity of the limbs. The section of the skin, of the cellular tissue, and other sub-

jacent membranes being effected, it must be raised up by an assistant: the retraction is facilitated by the division of the bands which may yet confine it to the surface of the muscles. The mode of proceeding employed by many practitioners should be particularly avoided, by which they seize the skin with the fingers or dissecting forceps, draw it out forcibly, and detach it by a bistoury with very painful dissections. The flesh should afterwards be divided, even with the retracted integuments, by a circular incision down to the bone. We are even obliged to make a third, sometimes a fourth, and even more in order to effect a perfect division, and high enough up of the muscles adhering to the bone so as to prevent their protrusion. The operation is finished by the division of the bone, and the immediate ligature of the vessels, observing to cut off the ends of the threads on a level with the edges of the stump.

From this method there results a conical stump, the uniting of which becomes easy. To keep the edges close together, it is only necessary to keep them fixed by a circular bandage, and not very tight, and a piece of fine linen, which covers the wound: over this should be put a pledget of lint, supported by two cross pieces. The dressing is then completed by the application of a roller of a proportionate length, without passing it over the summit of the stump: by the assistance of this bandage the muscles are commanded, and their retraction prevented.

Uniting bandages should be avoided, such as the cap, and others similar to it: they hurt and fatigue the parts by preventing that tumefaction and fulness necessary to produce a good suppuration. The consecutive dressings ought to be effected by the most gentle and simple means, such as balsamic digestives, to which may be added substances more or less tonic, according to circumstances. Great care ought especially to be taken to preserve the greatest cleanliness round the circumference of the wound, in order to facilitate the cutaneous perspiration.

The proceeding I have just decribed may be employed in

all cases, even in those in which the amputation had been performed with the flap, which, in my opinion, brings with it a multitude of inconveniences. I have had the opportunity of forming the comparison between these two methods; and the constant success which I have obtained from the circular amputation, has convinced me that it presents greater advantages than the flap operation, which is still extolled by some modern practitioners.

Amputation at the joints, or, to speak more correctly, the extirpation of limbs, ought to be performed with flaps. These flaps will quickly unite, and will adhere together on the surfaces of the joints, which ought not to exfoliate, since they have undergone no change from contact with the air, nor have they been touched by the knife.

Lastly, after having put in practice one or the other of these methods, we must apply ourselves to the proper mode of conducting the treatment; for it is not enough to have performed an operation with dexterity, it is of equal consequence to know how to prevent or to remedy the accidents which may supervene.

Of Consecutive Amputation.

If it be possible to point out the cases where it is necessary to amputate immediately, it is impossible to determine *a priori* those cases which will require consecutive amputation. One gun-shot wound, for instance, will heal by the ordinary treatment, whilst another, less serious in the beginning, will, either by the bad constitution of the subject, or by traumatic fever, oblige us to have recourse to the last extremity. However it may be, the certain rule to fulfil the indication presented, is not to amputate consecutively till under those circumstances in which all our cares and attempts to preserve the limb have become entirely useless. It is in this that our doctrine differs from that of Faure.

This practitioner admits cases, which he denominates cases of the second kind, in which he retards the amputation, not to endeavour to preserve the limb, but to allow the first symptoms to pass over. The operation performed from the fifteenth to the twentieth day appeared to him less dangerous than at the first instant. At this period, according to him, the commotion produced by the violence of the wound is dissipated; the patient can become accustomed to the idea of amputation, the name of which alone impresses upon pusillanimous persons a degree of terror more or less strong; the degree of weakness in which the patient is found gives no reason to fear an oozing of blood after the operation; lastly, collecting himself, he delivers as an axiom "that all amputations performed immediately are in general extremely dangerous from their consequences." He reports, in support of his theory, the cases of ten wounded men, which he kept in reserve, after the battle of Fontenoy, in order to amputate them consecutively with the greater success, which, he says, succeeded completely.

This division of the cases of amputation into two kinds, disavowed by nature, has been the cause of much mischief. Very often the partisans of Faure have been afraid to have recourse to primitive amputation, the dangers of which they exaggerate: at other times they have amputated consecutively without any success.

The effects of the commotion, far from being aggravated, are diminished, and disappear insensibly after the operation. So long as the violent commotion continues, the solids are in a considerable state of tension; but shortly after a complete atony succeeds. The circulation of the fluids is disturbed by the shock which the re-action of the solids has produced, and the machine is in such a state of disorder, that the functions are all deranged. The proximate cause of all these accidents depends on the violent percussion of the foreign body, which is propagated to a distance by shaking all the parts which are susceptible of it; it depends likewise on the laceration of the wounded nerves, or their

imperfect division, and on the swelling of the vessels of every description: the speedy amputation of the limb ought then to induce a favourable change in the whole living economy. In fact, the stretched nerves, by being divided, return to a state of liberty, and the fluids circulate more easily; the irritation, at all times accompanied with terrible symptoms, is appeased; the vessels before swelled, empty themselves, and return to their natural state; the strangulation, inflammation, and tension are thus prevented, which always accompany great lacerations. It is then demonstrated that the commotion, far from being a counter-indication to primitive amputation, ought to determine the surgeon to it. This is likewise the advice of Lamartiniere and Boucher.

Jean Carreau, a volunteer, aged fifteeen years, at the same catastrophe where Maugran was mulitated, had the right-leg almost entirely carried away by a splinter of stone, which produced a violent commotion of the right-thigh: the left-leg was fractured by the same blow. Carreau as well as Maugran had the face and hands very much burnt. I instantly amputated the right-thigh, and dressed the left-thigh methodically. These operations quickly dispersed the effects of the commotion, and prevented, without doubt, the fatal accidents which would have come on. The wound of the stump of the thigh was soon cicatrized; but there was a considerable *necrosis* of the tibia of the fractured leg, which retarded the cure: it was nevertheless completed before the end of the fourth month.

M. Moreau, aged thirty years, an officer of the staff of the army of the oriental Pyrenees, under the Fort Figuieres, on the 20th of November, 1794, received a wound with a canon-ball, which disorganized the left-arm below the insertion of the deltoid muscle, which obliged me to perform the amputation very near the shoulder-joint. The violent shock which the ball produced was followed by a broad ecchymosis on the shoulder itself, which indicated

the necessity of operating at the articulation: and I must confess, that notwithstanding the success obtained by the operation performed, I did not perfectly fulfil the indication. The small portion of stump preserved to the patient, was entirely useless to him, and incommoded him greatly. This patient beside experienced after the operation some serious symptoms, which, without doubt, would not have happened, if I had performed the operation at the joint. A very singular phenomenon occurred during the treatment of the wound. The ligature of the humeral artery, not having come away, was retained under the cicatrix of the stump, as it has several times since happened in my practice.* I found the means however to extract it, as will be seen hereafter in a case in the campaign of Austria.

I shall observe here, that the cases I have already reported come in to the support of my reasoning, since in all of them, the commotion was one of the most grievous symptoms.

Neither ought the fears of the patient to suspend the operation; for, indeed, at the moment of the accident, a wounded man will have much less dread of the danger he is likely to incur, than after the first four and twenty hours, when he has had time to reflect and calculate upon all the consequences of the wound and of the amputation. This very judicious remark was made by our illustrious Parè in his works.

It is sufficient to be acquainted with physiology to perceive the falsity of the last obection of Faure with respect to the oozing of blood. The instantaneous emptying of the vessels which takes place on the section of the limb, prevents the internal commotion which might take place at the moment of their ligature; and as the molecules of the fluid which fills them, are found to be in an exact and

* No wonder, if the ends of the ligatures are cut off on a level with the edges of the stump as above directed. TRANSLATOR.

uninterrupted continuity to the heart, the smallest resistance diminishes the action of this organ, which is beside deprived of an equal quantity of venous blood, which the capillary system, nourished by the divided arteries, ought to have supplied it with; the equilibrium is re-established, and nature very quickly habituates herself to the change, which is effected without derangement, as experience has demonstrated.

I shall say nothing of the fulness of the capillary vessels of the stump which supervenes, because it is necessary to the establishment of the suppuration, without which the divided parts could not subside and cicatrize. Nevertheless, if the inflammation was too violent, it would be hurtful; but its evil effects may be prevented by bleedings, by antispasmodics, and cooling medicines; and, lastly, by leeches and emollients applied to the stump.

Experience, agreeable to my theory, has demonstrated to the surgeons of the sea and land-service, that the primitive symptoms (the consequences of gun-shot wounds which ought to have induced the loss of the limb) are more to be feared than those arising from immediate amputation. Out of a great number of wounded men who suffered amputation within the first twenty-four hours, during the terrible and memorable naval battle of the 1st of June, 1794, there only died a very few. These facts have been attested to me by several of our colleagues, and particularly by M. Fercoc, principal surgeon of the Jemappe line-of-battle ship. I add here the extract of his letter.

"During the naval action of the 1st of June, 1794, there were a great number of amputations immediately after the wounds. Sixty of these patients were carried to the naval hospital at Brest, and confided to the care of M. Dupret; two only died of tetanus: the rest were all cured: one of them had both arms amputated. The surgeon of the Temeraire, which was taken by the English, wished to defer the amputations indicated by many of the wounded,

until his arrival in port, according to the advice of the English surgeons; but he had the mortification to see them all die on the passage, &c. &c."

Being sent in the year 1798 to the army of Italy, in the capacity of surgeon-general, I had likewise the pain of witnessing the death of a great number of wounded men, victims to the confidence which the surgeons of that army had in the principles of Faure. General Bonaparte perceived that a flying ambulance (*ambulance volante*) was alone capable, in case of fresh hostilities, of preventing similar accidents; and it was in consequence of his order that our present form of ambulance was established.

Since that time our armies have always been provided in the day of battle with the apparatus for amputating in the most expeditious manner possible. The very sight of these corps of ambulance, constantly attached to the advanced guards, gave confidence to the troops, and inspired them with more courage.

CASES WHICH RENDER THE CONSECUTIVE AMPUTATION NECESSARY.

FIRST CASE. *Mortification without bounds.*

In order to proceed methodically, we should study first the nature of gangrene, and the causes which induce it.

If it is owing to an internal and general cause, there would then be a great degree of temerity in amputating before nature has traced out the limits. This kind of gan-

grene is distinct from that which we have designated traumatic gangrene, by the symptoms which precede and which accompany it: these symptoms are those of *ataxia*, or of *adynamia nervosa*. This is the case in which the operation should be deferred, and the general causes combated by proper regimen and internal medicines.

But if the gangrene is traumatic, the limb should be amputated without delay above the disorganized point. This amputation is performed with success, especially when the deleterious miasmata have not been absorbed in great quantity. Several facts in support of this opinion are reported in my memoir on traumatic gangrene.

SECOND CASE. *Convulsions of the Wounded Limb.*

The section of the limb performed during the first moments of tetanus, intercepts all communication between the source of the evil and the rest of the body: this division, by emptying the vessels, puts an end to the nervous shootings, and destroys the convulsive mobility of the muscles. These first effects are followed by a general collapse, which favours the excretions and sleep, and restores the equilibrium in all parts of the body.

The sum total of the momentary pains occasioned by the amputation, cannot possibly augment the existing irritation; beside the pains of tetanus render those of amputation more supportable, and diminish their intensity, especially when the principal nerves of the limb are strongly compressed.

THIRD CASE. *Diseased Suppuration.*

It often happens in gun-shot wounds complicated with fractures, that in spite of the best directed cares the suppuration becomes putrid; the osseous fragments are soaked

in the discharge, and do not at all tend to unite: hectic fever and colliquative diarrhœa lay hold of the patient, and, in this extremity, amputation has sometimes saved life, by recalling, by the pain it occasions, the sinking strength, and exciting inflammation in the stump.

Fourth Case. *Bad State of the Stump.*

The cure of patients who have suffered amputation is often prevented in hospitals by a fever of a bad type. The stump tumefies; the skin, which at first covered the surface of the wound retracts, turns back, and becomes disorganized to some distance. If this peculiar affection continues ever so short a time, the wound becomes changed into a fungous ulcer, the cicatrization of which is prevented by a deep seated affection of the bone and erosion of the soft parts. A protrusion of the bone frequently happens from the retraction of the superficial muscles, which have not been cut low enough down: it likewise happens when sufficient attention has not been paid to fixing them in a suitable position with regard to the end of the divided bone, by methodic dressings, and by a favourable position during the treatment. It has been proposed, in either case, not only to saw off the denuded portion of bone, but even to cut off the end of the stump to a level with the skin. This operation appears to us useless, and perhaps dangerous; 1st, on account of the hæmorrhage, which might be produced by vessels deep-seated, and difficult to secure; 2d, on account of the very violent irritation which supervenes in the amputated limb, the sensibility and irritability of which are greatly increased by the disease. It is better then to abandon the work to nature, by whose means the portion of bone in a state of *necrosis* is first separated, and the retracted flesh afterwards gradually brought down and depressed, which is effected by a vascular developement,

and a sort of attraction common to living parts, when they have been divided, and the irritating causes which produced their primitive separation have ceased. The cicatrix begins from the circumference to the centre, the skin approaching by a circular contraction. About the fifty-fifth day from the accident, the conical form of the stump disappears, and the cicatrix is gradually effected, assuming a convenient shape. The duty of the surgeon, then, is to second the operations of nature without seeking to abridge her work, which would only be prolonged and rendered more difficult. I have witnessed myself several stumps of amputated thighs in this situation, which, after having cast off the *necrosis*, have resumed the shape desired; this proves the inutility of the second operation. Lastly, the conical form seldom takes place when the operation has been performed according to the plan here described.

Case wherein the Preservation of the Limb ought to be attempted, although Amputation appears to be indicated, and may have been advised by Authors.

In general, if the fracture of bones produced by musket-balls or small grape-shot, which is not accompanied with loss of substance of the soft parts, or rupture of the vessels, or principal nerves, do not demand amputation, the preservation of the limb may be ensured by the employment of the means pointed out. These means are incisions, extractions of foreign bodies, simple dressings, proper position, rollers, or eighteen-tailed bandages, anodynes, cooling internal medicines, and suitable topical applications. Spirituous applications, ointments and oils ought to be rejected, and only simple remedies employed.

General Morangier, who was wounded for the second

time in Egypt at the last battle of Aboukir, furnished a very striking instance of the possibility of preserving a limb, notwithstanding the extensive fracture which accompanied the wound. That of the General occupied the inferior extremity of the right-arm very near the elbow-joint. Dilating the wound, the extraction of splinters, and methodical dressings conducted the patient to a cure. This fact, and several others which I could quote, prove how circumspect we ought to be in the case we are now treating of. We ought more particularly to spare the superior extremities, which may be of the greatest importance for the necessities of the patient, although they may be mutilated. This general rule is not applicable to the inferior extremities. In fact, when these are affected with ulcers or caries of the joints, they are rather prejudicial than useful. Progression becomes painful; attraction and stagnation of the fluids take place in the interior of the limb, in consequence of the permanent irritation which exists there. The fulness of the vessels aggravates the ulcers; inflammation, and often gangrene make their appearance, and cause these unfortunate invalids to envy the lot of those whom they see walking with artificial legs.

Authors have beside recommended the amputation of the limb for the rupture of the principal artery, although the other soft parts shall have been spared; but the simple ligature of the vessel, in many cases of the kind, has been accompanied with so much success, as imposes a duty upon us to attempt this means before proceeding to the operation. I have witnessed four successful instances of this kind: however the case deserves the utmost attention on the part of the surgeon.

One of the grenadiers of the imperial guard having had the humeral artery cut by a blow of a sabre in a duel, was threatened with the loss of his life by a gangrene which made its appearance upon the fore-arm, in consequence of the ligature made upon the artery. I lost no time in am-

putating the arm above the wound, although the gangrene had no boundaries, and the patient was saved.

I shall relate some cases of wounded men cured without amputation, although their wounds were complicated with enormous fracture of the superior extremities: it was in the hospital at Perpignan that I had the opportunity of seeing these patients.

A volunteer, about thirty-four years of age, received a wound from a musket-ball, which crushed a third part of the middle of the right humeral bone, for the space of about three inches and a half, and slightly injured the soft parts. On his arrival at the hospital, the wounds produced by the ball were in a bad condition; their edges were inverted and callous; the fungous granulations discharged a fetid sanies. All these appearances caused me to suspect a caries of the bone, and the presence of splinters; in fact, the probe demonstrated the existence of the latter. I found even a sort of new bone which nature had produced to supply the loss of the old one. I extracted the splinters by suitable incisions; and after six weeks of treatment in the hospital, this patient was cured. The limb, not much shortened, preserved all its movements.

Jean Fayolle, aged twenty-six years, had the body of the left humeral bone fractured and much splintered. Three months treatment were sufficient for the cure: he preserved the arm with part of its movements.

Guillaume Fougere, aged thirty, received a gun-shot wound, which splintered the bones of both fore-arms, near the wrist joint: he was cured however in a short time and preserved the use of his hands.

Many similar cases, in which I have observed the same mode of treatment, and which were accompanied with the same success, have occurred in the different armies in which I have practised.

Under all circumstances amputation ought to be the last resource; but when once the necessity for it be well

ascertained, there should be no hesitation in putting it in immediate execution; that is to say, before the attack of the primitive symptoms. If these have taken place when the surgeon is called to the assistance of the patient, he ought to wait until they subside. In short, genius and experience alone can turn to the profit of the patient, the precepts of good surgery.

CAMPAIGNS

OF

SAXONY, PRUSSIA, AND POLAND.

Our troops quartered in Berlin,* wishing to withdraw themselves as much as possible from the effects of the cold in the month of December, shut themselves up in rooms strongly heated, according to the custom of the country, with stoves *(pöeles de fonte)*, and a great many of them were affected with *asphyxia*. Some of these having been brought soon enough to the hospital, received assistance in time, and were recalled to life; the rest fell victims to this fatal accident.

The inspection of their bodies after death, presented to me the same symptoms, as I had already observed a long time since in those who had died from *asphyxia* by water, or by pernicious gases, such as the carbonic, &c. and which some modern observations have pointed out, though imperfectly.

In those that perished at Berlin, the whole surface of the body was puffed up, and of a violet colour more or less

* The military details of these campaigns being totally unconnected with any of the medical observations, and the copious descriptions of the cities, towns, and villages, serving no other purpose than to swell the volume, I have thought proper to omit them altogether, in order to make room for such matter as is purely medical. Translator.

dark, according to the declivity of the parts. The cutis having lost its elasticity, and all its properties, there were no sensible secretions; and on dividing it through its thickness, it was seen sprinkled over with a vascular net-work, filled with a black and very liquid blood. (In drowned persons the skin, which receives the contact and permament impression of the water, does not exhibit the same alterations.) The subcutaneous vessels were likewise injected with a black blood. The colour of the muscles was brownish, and the fibre was softened. The limbs were pliable, and the joints easy to move, as is found in drowned persons, at least if they have not been affected by the frost. The brain and its membranes presented much the same appearances as in drowned persons. The lungs were tumefied and filled with blackish blood; the mucous membrane was covered with *ecchymoses*, and the bronchial vessels were filled with gas, which was made to pass out by pressure. The arterial cavities of the heart were full of a black and liquid blood, the intestines were inflated similar to those of drowned persons. From these results it is easy to conceive that the animal life was the first affected, as I have before had occasion to observe in some drowned persons in the campaign of Piedmont.

In fact, the organs of sense first cease from their functions, the muscular action becomes paralyzed, and the first effect resulting from it is, the falling down of the patient if he is standing: all the animal functions become by degrees annihilated, and those of interior life in succession. It appears, as Doctors Portal and Bichat have affirmed, that the brain, and the nervous system which emanates from it, are almost instantaneously paralyzed by the sudden and rapid transmission which takes place of the deleterious carbonic principle, on one hand absorbed by the lungs, and carried to the brain by the arterial blood; on the other, distributed by the pores of the skin over the capillary system, the subcutaneous nerves, and perhaps the muscles; this produces in an instant the decomposition of the galvanic

fluid, and strikes with death the sensible parts of animal life. The organic life still supports itself, because the red blood, although blackened by the absorption of the carbonic acid gas, continues to excite the heart, which keeps up the vital force of the interior organs: it is likewise that which preserves to the limbs their pliability, even after death. The bodies of persons dead of *asphyxia*, putrify very readily, and their decomposition is extremely rapid.

When the asphyxia does not terminate thus fatally, it disposes the patients affected with it to the nervous putrid fever, from which they do not recover without a long and painful convalescence. When the disease has been carried to a very high degree, the skin becomes gangrenous in the most prominent parts of the body, and forms sloughs of greater or less extent.

As the carbonic gas is much heavier than the atmosphere, it circulates over the floor of the room, or occupies a height relative to its quantity; so in the place where these accidents occurred, such of the soldiers as chanced to be nearest the stove, lying upon the floor, or upon a small quantity of straw, which is always scarce in large towns, were the first to be affected with the *asphyxia*, and to the most dangerous degree. The corporal of the detachment, of which these unfortunate men formed a part, escaped the danger, with three other soldiers, because they were all four lying upon the beds or tables of the room near the windows, and at some distance from the stove. These were awoke by the drums, and found themselves benumbed, and attacked by a violent head-ache.

One only was able to get up and open a window: the air began to revive them; but he was seized with alarm when he perceived that his comrades did not answer to his call; and those lying on straw upon the floor did not make the least movement. He called aloud for help; and though extremely weak himself, he assisted those that were upon the bed, and with great difficulty roused them from their lethargy. At length the people of the house and the other

soldiers ran to their relief: they instantly opened the doors and the windows, called in medical assistance, and afforded to the unfortunate sufferers all the relief in their power. Three of them were already completely recalled to life; they continued nevertheless to feel great inconvenience for several days afterwards. Five were carried to our hospital, and arrived there at the moment of my morning visit. We were not able by any means to restore the vital principle in three of them; we concluded however by placing them in a large room well aired, for observation during twenty-four hours. At the end of this time the bodies were opened, in the presence of all my pupils, and furnished us with the results I have already spoken of. The assistance we administered to two others, restored, though imperfectly, the play of the organic functions. Frictions with snow over the whole surface of the body; frictions with alkalies and alcohol, dry cupping, scarifications, small bleedings from the jugular vein, in order to empty by degrees the veins of the head; acidulated drinks, stimulant cordial draughts, and sometimes emetics: afterwards, bitters, bark, and cinnamon were employed with advantage; but in one of the two, gangrenous sloughs took place on the sacrum, and on the angles of the scapulæ, which very much prolonged his convalescence. That of his comrade too was extremely long and painful, and he laboured a long time under a great weakness in the organs of speech and of intellect.

As accidents of *asphyxia* occurred in several parts of the cantonments of the imperial guard, I took measures to prevent those which might still happen; and in consequence of my representations, an instruction relative to it was inserted in the order of the day, which was productive of all the effect I expected from it.

To the first very severe colds of the winter, there succeeded heavy rains and thick fogs, which furnished us a great number of sick, principally labouring under a catarrhal *adynamic* affection, and with diarrhœas, which yielded easily to the treatment indicated. But the most

severe affection was syphilis, which spread with great rapidity amongst our soldiers, and which presented in a great number of cases a very formidable character. It was necessary to combine with the anti-syphilitic remedies, according to the complication, febrifuges or tonics. On the whole we lost but very few patients. The departure of the army for Poland put a period to the causes of these diseases, and the troops in general, as soon as they were on the march, resumed quickly their pristine force and vigour.

The campaign of Poland being undertaken in the depth of the winter, exposed the troops to more privations and fatigues than that of Prussia; the forced marches, and wet muddy bivouacs where they passed many nights without provisions, or comforting drinks, had greatly weakened them. We had consequently a great number of sick, almost all attacked with catarrhal, bilious, or gastric fevers, which, in the young subjects, were complicated with *adynamia.* Nevertheless, these complaints disappeared with the causes which produced them, and the health of the army was soon restored on reaching good cantonments. On the banks of the Vistula our troops were generally in good condition; all the wounds went through their regular stages, without disturbance, or any remarkable accident. Those of the joints, though severe, were cured by the means pointed out in my campaigns of Egypt. I shall content myself with noticing some of the most important of them.

A trumpeter of the corps of Mamelukes, who had charged, with the cavalry of the imperial guard, a numerous body of Cossacks, well trained and armed with sharp scymetars, was struck on the right shoulder by one of those Muscovites. The joint of the shoulder was laid open; the head of the humerus entirely cut through and separated foom the body of the bone; in short, the arm was only held by the tendons of the great dorsal and of the pectoral muscles, and by the axillary vessels and nerves. He was dressed close by the field of battle. Having conceived the hope of curing him,

from the success I had obtained in a similar case in Egypt, I attempted to procure the union of the wound, after having extirpated the head of the bone; but the success was only temporary. The length of the march and the bad weather produced the most serious symptoms. On our arrival at Warsaw I was only waiting for convenient opportunity to perform the amputation. Counter openings were made to the sinuses which had formed round the joint; the dressings were conducted with gentleness, employing hot wine with camphor or honey, according to the state of the parts; and, to my great and agreeable surprise, the symptoms subsided, and in the end entirely disappeared. After a treatment of several weeks diligently and zealously conducted, the wound cicatrized; the humerus contracted an anchylosis with the scapula, and this Mameluke returned to France perfectly cured.

Three Chasseurs, who had received slighter wounds, but which penetrated into the joints of the superior members, were likewise cured by the same method. The union was not exact, and the bandages no way impeded the circulation, either in the capillary vessels of the membranes of the joint, or in those of the lips of the wound: a retaining bandage, and the simple means before mentioned, were found sufficient. A fact equally curious presented itself at the battle of Golominn in the person of a brigadier of cavalry, whose case we shall report. This brigadier was struck during a charge by a ball from the flying artillery, which grazed his right-arm; but instead of a contused wound, the contact of this ball, which was spent, produced only an ecchymosis on the injured part, and on the skin only a small opening, which had the appearance of being made with the point of a sabre. This wound, which appeared altogether simple to one of my co-adjutors, was dressed simply, and the patient passed the first periods of suppuration without accident.

About the ninth day, the discharge having put on a sanious appearance and a blackish colour, a caries of the

bone was suspected: the wound was probed; and the surgeon who had the care of this patient, to his great surprise, discovered a hard and sonorous body, deeply situated in the interstices of the biceps and anterior brachial muscles. He laid open the wound; and laying hold of the extraneous body with a strong pair of forceps, he extracted it. This extraction was instantly followed by a tremendous hæmorrhage, which was stopped, it is true, by compression, but which quickly returned. This patient had in fact experienced a third hæmorrhage, when I saw him for the first time. The case appeared to me sufficiently serious to require either the ligature of the brachial artery, or the amputation of the arm. The first operation presented so much the greater difficulty, as the edges of the wound were tumefied, and the arm extremely painful: the second was too severe to determine on the instant execution of it. I was willing then, for the last time, to try less violent means. I laid the wound open deeply down to the course of the artery, which was cut through by the bistoury. The hæmorrhage instantly stopped, and I conceived the hope of being able to prevent its return by the application of some styptic substance, such as a digestive enlivened with sulphuric acid, bark, and camphor, and by a uniform gradual pressure over the whole of the arm and fore-arm, made with compresses dipped in a mixture of hot camphorated wine, sulphuric acid, and alumine. The hæmorrhage did not return; the strength of the patient was restored. The arm, being deprived for a long time of the pulsations of the radial and cubital arteries, was almost in a state of atrophy; the skin was deprived of its epidermis, and had lost its animal heat: however the properties of the respective parts were gradually reproduced; the muscular vessels and the profundæ supplied the functions of the humeral artery, which was obliterated: the pulse returned, and the patient was perfectly cured on the seventy-fifth day from the accident. This soldier has been since sent to the thermal

waters, which ought to restore the nutrition and movement to the affected limb.

The extraneous body extracted from the arm of this dragoon, was found to be a portion of the point of his sabre, about three inches long, and ten or twelve lines broad, which the ball had met with in its passage, and which it had driven before it into the thick part of the arm. It is very difficult to explain this phenomenon, but I will vouch for the fact.

The battle of Golominn furnished us likewise some wounds of the head, with division of the bones of the cranium and injury of the meninges and cortical substance of the brain. These patients were completely cured.

The battle of Eylau, the most dreadful ever witnessed, furnished us vast numbers of wounded men. I had in the morning of that day established an ambulance for the imperial guard, in the barns near the entrance of the town; but unfortunately they had been opened on all sides, and the straw that covered them was taken away for the horses. We were under the necessity of placing our wounded men upon the dunghills covered with snow; and there were several thousands of them, as well of the guards as of the line, collected together in these unsheltered accommodations. I first gave my attentions to the imperial guards; but, faithful to my principles, I began with those which were the most severely wounded, without distinction of rank. The cold was so intense, that the instruments fell from the hands of the assistants who served me at the operations. They were obliged to relieve one another at this duty every half-hour.*

At a moment when a real consolation was diffusing itself

* I have thought proper to omit here a long eulogium which the author pays to his own extraordinary zeal and perseverance during this battle; the concluding sentence, however, is too good to be lost. "Several great operations, such as the extirpation of the arm at the shoulder-joint, were performed *in less than two minutes! !*" TRANSLATOR.

over the breasts of our wounded men, an unexpected movement, made by the right-wing of the enemy to turn our left, precisely at the station of the ambulance, threw these unfortunate sufferers at once into confusion and despair. Such as were able to walk took to flight; the others made vain attempts to follow them in order to escape the fury of the Tartars: but we were their preservers and their support: it was our duty to die amongst them, rather than seek an ignominious safety. I finished the incision I had begun in a leg, and expressed with firmness in the presence of all the wounded men who remained, my resolution not to abandon my post. I assured them that whatever might be the result of this alarm, which appeared to me false, they had nothing to fear for their lives. All my pupils rallied round me, and swore not to leave me. We succeeded in stopping and bringing back a great number of the fugitives.

An impetuous charge made by the cavalry of the guard upon this column of the enemy, in the midst of whirlwinds of snow, prevented the event so much dreaded by our wounded. Tranquillity was restored, and we were able to continue our operations. All those severely wounded in the imperial guards, and a great part of those of the whole army, were dressed, and their operations performed in the first twelve hours: it was not till then that we could take a little rest. The rest of the night was passed upon the frozen snow around the bivouac fire of our ambulance. Never was a day so trying to me: I had the misfortune to see several of these wounded men die, whose cases required amputation at the hip-joint, because the unfortunate circumstances in which we were placed, the excessive cold, &c. prevented me from undertaking those difficult and dangerous operations.

The next day at day-break we resumed our functions with the wounded men of the guards, giving assistance at the same time to a number of those of the line, and to the Russian prisoners. I was particularly occupied too about the removal of our own wounded. I first caused all the severe

wounds, such as had suffered amputation of the thigh or leg, or had received dangerous wounds of the breast, and several for whom I had applied the trepan, to be removed into a large house in the town of Eylau.

The impossibility of all the wounded both of our own and of the enemy being contained in this small town, already crowded with troops, the danger of an epidemic breaking out amongst them, and the extreme penury in which we were, in the midst of plains covered with snow, abandoned by their inhabitants, and destitute of all resources, were so many motives which imperiously demanded the evacuation of the wounded. The Emperor had foreseen all these circumstances, and was persuaded, that it was better to expose the wounded to the vicissitudes of a long, difficult, and at all times painful removal, than to see them dying from causes which it would not be possible to remedy. Beside the march of the enemy was not yet known. An order was given for their general evacuation, and I effected the removal of all the serious wounds of the guards in the first twenty-four hours. They were removed from Eylau to Inowraklaw, a distance of a hundred and sixty-five miles, through the worst of roads, over ice and snow, and across the floods of the brooks swelling from the recent thaw.

I shall endeavour to point out the advantages to be derived from the speedy removal of the wounded after a battle, when they cannot be taken care of in the neighbourhood of the field, during the first periods of the wounds, with that security and attention to health which their situation demands. In giving my opinion on this subject, I am supported by experience; and his Majesty, without doubt, in ordering this measure, called to mind the success we had obtained in the evacuation of the wounded from the siege of St. Jean D'Acre in Egypt.

In fact, no one can doubt of the serious inconveniencies which must result from the state of rest in which the wounded remain, when collected in too great numbers in a hospital after an action.

Adynamic affections, the hospital gangrene, proceeding from the copious discharge from the wounds, and other animal excretions; the inquietude and fears of the patients, who, reflecting on their situation, and the loss they have sustained, render each other mutually melancholy and absorbed in grief; all these causes impart to even simple wounds, and still more to severe ones, a serious character; and their termination is too often fatal. In what a different situation, on the contrary, do those patients find themselves, who have been removed to different points a short time after the battle! The movement, both external and internal, which takes place during their transportation from one place to another, excites and keeps up the play of the organs; all the muscles are in motion; the circulation is accelerated; the secretions are kept up; the suppuration takes place in just proportions; the sloughs are readily detached by the increased oscillation of the subjacent vessels; the wounds become cleansed; their edges unfold, and approximate themselves by the gradual expansion of the vessels; and by virtue of this general excitement, they inosculate amongst themselves, or contract adhesion, by means of the slight inflammatory swelling that supervenes. The external air, always more pure than that of inhabited and close places, gives activity to the secretions, the cutaneous transpiration, more especially, is continually carried off by the free current of air, and the patients would have little reason to fear its repercussion.*

* M. Larrey has given us here a specimen of the superiority of "*the French surgery over that of all other nations, even the most civilized.*" It must certainly be considered as an important discovery in military surgery, that the removal of wounded men a hundred and sixty miles, over the worst of roads, through ice and snow, is attended with such great and incalculable advantages, that its superiority over the old plan, of recommending rest and the utmost tranquillity after operations, &c. cannot escape the notice of the most inattentive. There is above another whole page taken up in the recapitulation of the benefits to be derived from this kind of travelling to patients with broken bones, amputated limbs, tre-

In the retreat from Syria, notwithstanding all our disadvantages, we lost only a fifteenth of the wounded. In Poland, in spite of the severity of the cold, and the difficulty of the roads; in spite of the insufficiency and imperfection of our means of transport, for we were obliged to add to our own carriages with springs, sledges and vile waggons, the movements of which were rendered still more painful by reason of the thaw and frost which followed each other successively; in fine, notwithstanding the penury of provisions, and the fatigues of every description attendant on a long route, my wounded men, in the general way, arrived in good condition at Inowraklaw, where their cure was prompt and complete: we lost scarcely the eleventh part of them, and there were nevertheless a tolerable number of very severe wounds among them, as well by their own nature, as by the accidents with which they were complicated; such were certain wounds of the breast and head, and amputation of the thigh with the hospital fever, which had already began to shew itself in the hospital at Eylau. It is very probable that these unfortunate patients, had they remained in that town, would have died of this complication, which would without doubt have become epidemic as at Brün. I remember myself placing several wounded men on the carriages, who were scarcely able to turn in their bed, and whom we expected to see expire within four-and-twenty hours, who nevertheless arrived at their des-

panned skulls, &c. which I have thought proper to omit, being aware of the prejudices of my countrymen against these kinds of improvement.

One would have thought that the most determined parasite would have been contented with endeavouring to establish the necessity of the measure as a plea for the barbarity of his master; but this attempt to prove its great utility, is excelling Gnatho in his own art:

"Quicquid dicunt, laudo: id rursum si negant, laudo id quoque:
"Negat quis, nego: ait, aio: postremo imperavi egomet mihi,
"Omnia assentari." *Terent. Eunuch.* Act ii. Scen. 2.

Translator.

tination free from fever, the wounds clean and in good condition. So happy a result ought fully to justify such a measure in the minds of those persons who regarded this evacuation as an act of barbarity, yielding, as it was natural, to the sentiments of pity, which these wounded men inspired, by their situation, and by the repugnance they manifested to going.

I shall here make some observations on such of these wounded as presented any singular phenomena, and which required great operations.

M. Labit, captain of the 69th regiment of the line, received a severe wound by a cannon-shot, which disorganized the superior part of his left-arm: the mischief being confined to the part just below the shoulder, I was at liberty to employ my own method for amputating the limb. This operation was speedily and successfully performed: this officer was removed to Thorn, and a short time afterwards I learned that he was perfectly cured.

A dragoon of the 6th regiment was suffering cruelly from a wound of the left shoulder, with loss of substance of the deltoid muscle, fracture of the head of the humerus, and laceration of the brachial plexus: this was, without doubt, the cause of the horrible pains the patient was suffering. Notwithstanding the extreme cold, I preserved a sufficient firmness of hand to effect the extirpation of the arm at the joint.

This amputation was succeeded by a perfect calm: the patient slept immediately after, wrapped up in his cloak; his sleep continued until next morning, when he was removed to Thorn.

M. ———, a captain of the 6th regiment of cuirassiers, presented to us the uncommon case of a limb carried away by a shot, just as if it had been cut through by a sharp instrument. The division was effected at about an inch above the elbow-joint. Some surgeons who had seen him before me, had applied over this kind of stump, a pledget of lint and a simple dressing, telling him that he might

avoid the operation. But the severe pains which had already begun to be felt, and a sort of painful numbness, made him desire and earnestly request it.

I amputated the limb several inches above, which produced in an instant a perfect calm. The patient slept upon the snow, and he was obliged to be awoke in the morning, when the horse was brought to carry him to the hospitals of the line. It must be observed that the humeral artery was torn off more than four fingers breadth above the mutilation. I had some trouble to discover it in order to tie it up. It presented in the broken portion a sort of conical belly of its extremity next the trunk, which might be called a true aneurism. This officer was conducted to a perfect cure by the surgeon of his regiment.

The amputations of the thigh were generally followed with success, and no conical form of the stump took place in those on whom I could operate immediately. It often happens, that when the precepts I have laid down are not followed, and this operation is too long delayed, the conical form of the stump will sometimes be seen at the first dressing, because the muscles are irritated by the first inflammation, and their retraction is consequently much stronger than when the section is made before any tension has come on. The advantages of this may be judged of by the following cases:—

A corporal of chasseurs had the right-knee destroyed in a great measure by a cannon-shot. I immediately amputated the thigh in the usual place, but I took the precaution to carry up as high as possible the section of the muscles, and to saw off the femur on a level with the last cut. Instead of uniting the edges, agreeably to my custom and my principles, I kept them near together by means of a compress and bandage applied rather tight. This chasseur was removed with all the rest, and I soon after saw him perfectly cured.

Two other chasseurs of the same regiment were amputated and dressed in the same manner, and with equal suc-

cess. The same operation was likewise practised upon five other soldiers of the guard.

The beginning of February was extremely distressing to the whole army, and especially to the imperial guard, who were incessantly in bivouac. Several who were severely affected with the cold, had the imprudence to approach their feet to the fire of their bivouac; and those who had the misfortune to be caught asleep, were attacked with the gangrene of congelation. I purpose giving a memoir on that subject. Those who escaped this accident were attacked with diarrhœas and dysenteries, with catarrhal and rheumatic affections, which owed their origin to the sudden change of temperature from cold to hot, to bad diet, and to the waters of Eylau. These mucous affections continued till our return to the banks of the Vistula, and during the whole time that the east and south-east winds prevailed. They were complicated sometimes with ulceration of the gums, or aphthæ.

Memoir on the Dry Gangrene caused by cold, or the Gangrene of Congelation.

One of the most unfortunate circumstances which occurred to us after the battle, was the congelation of the feet or toes, or of the nose and ears: a very small number comparatively of the soldiers of the advanced guards, were able to defend themselves against this unfortunate accident.

In some, the gangrene was confined to the epidermis, or superficies of the skin of the toes or heels: in others, the mortification penetrated more deeply into the texture of the skin, and for a greater or less extent: some of them lost the toes, or even the whole foot.

All physicians who have written on this subject, have considered the cold as its determining cause: however, if we pay attention to the time of the breaking out of this disease, to its progress, and the phenomena accompanying

it, we may easily convince ourselves, that the cold is only the pre-disposing cause. In fact, during the three or four days of extreme cold, which preceded the battle of Eylau, and till the second day after the battle, not a man complained of any accident depending on congelation; nevertheless, we had passed these days, and a great part of the nights from the 5th to the 9th of February, in the snow, and a most severe hoar frost. The imperial guard especially, had remained in observation in the snow, making very little movement for more than four-and-twenty hours: no person complained of having the feet frozen. In the night between the 9th and 10th, the temperature all at once rose from three to five degrees above the freezing point. A fall of glazed frost very abundant on the morning of the 10th was the forerunner of the thaw, which took place during the day, and continued nearly at the same degree of temperature for several days. From this moment, a great number of soldiers, both of the guards and of the line, presented themselves, complaining of sharp pains in the feet, numbness, heaviness, and a disagreeable formication in the extremities: they were very little tumefied, and of a dark red colour; in some, a slight redness was perceived near the roots of the toes, and on the superior surface of the foot; in some others, the toes, deprived of all motion, sensibility, and heat, were already black and dried up. All the patients assured me that they never felt any painful sensation during the extreme cold they were obliged to support at the bivouacks from the 5th to the 9th of February inclusive; and that it was not till the 10th, in which day the temperature rose eighteen or twenty degrees, that they perceived the first effects of congelation. They first experienced a painful tingling in the feet, to which succeeded a numbness, uneasy sensation, immobility, and a sense of weight; a feeling of cold, without being excessive, was at the same time perceived. All those patients who were able to get into the town, or to the fires of the bivouac to warm themselves, were the worst off: very fortunately the greatest part of them followed the

advice given them by myself and my colleagues. We ordered them to employ immediately frictions with snow, and afterwards lotions with camphorated brandy, which prevented the gangrene in those limbs in which it had not yet made its appearance, whilst at the same time it broke out almost instantly in those who exposed their limbs to the fire. Its progress was most rapid; it was nevertheless circumscribed, and its boundaries were for the most part confined to the toes: sometimes however it occupied half the foot: it very rarely ascended above the ancles.

The sphacelus of the foot must not be confounded with the gangrene of the skin: in fact, it often happens, and I have seen instances of it, that a greater or less extent of the skin of the foot has been struck with death, without the vessels, deep nerves, tendons, ligaments, and bones having lost the vital principle: in this case the patient experiences a sense of pain when the subjacent parts are touched; he accomplishes the execution of some movements of the foot, and the internal heat is preserved. Beside this gangrene is altogether superficial, and it is hardly possible to confound it with the sphacelus of the foot, which deprives the limb of all its movements, of feeling, and of all the properties which distinguish life: the patient cannot feel his foot, and it appears to him to be a foreign body suspended to his leg. In all cases, however, it is proper to wait the decision of nature before having recourse to extreme means, such as amputation, which ought besides to be preceded by the use of generous remedies.

We shall proceed to point out the progress and developement of this gangrene, or rather the mode of action of the causes which produce it.

The cold acts upon our bodies by blunting the sensibility of the organs, which receive directly the impression of it; the natural heat becomes absorbed; a disengagement and repercussion of caloric take place; the pores are obliterated; the fibres and the capillary vessels enter into a state of contraction; the fluids are condensed, and their course is

retarded. In the first moment the impression of the cold is painful, the skin becomes wrinkled, and loses its natural colour: nevertheless, the animal heat and the vital powers exert a re-action against this sedative and astringent power, which presents an opposition to the return of the fluids: the capillary system becomes distended with fluid by so much the more easily, as the minute branches are weakened, the skin grows red, its sensibility is blunted, and if the effects of the cold or congelation continue, it is extinguished by degrees, and presently a numbness and stupor come on. The parts may remain a greater or less time in this state of *asphyxia* without being struck with death: and if this cold diminishes by degrees, or if the person who has suffered from its impression passes gradually into an elevated temperature, the equilibrium may be easily restored together with the play of the organs, and the disposition to gangrene will disappear. But if, on the contrary, the persons labouring under this impression pass suddenly from an icy temperature to a hotter one, in such manner that the thermometer would ascend several degrees above the freezing point, there must necessarily supervene an obstruction in the part affected; and if it is considerable, the vessels necessarily lose their elasticity altogether, become paralysed, and sometimes burst and tear, which gives rise to vesicles, and chaps or chinks. The course of the fluids is interrupted in the vessels; there is a superabundance of carbon; the parts become black, and gangrene is established. The infection propagates itself through all the points that are debilitated or struck with the cold, as much by contagion, as by extinction of life. In this manner the gangrene continues its progress till it meets with a resistance from the vital powers. Here, the systaltic movement of the vessels, the irritability of the cellular tissue of the membranes and of the skin, which have resisted the action of cold, repulse the gangrenous principle; the extremities of the capillary blood-vessels and lymphatics, being irritated by the heterogeneous principles, and, far from absorbing them, become

distended and inflame; the gangrene is arrested, and a line of demarcation establishes itself between the dead and the sound parts. If the mortification is superficial, the sloughs are generally detached about the ninth or thirteenth day: they leave a red wound or ulcer, of a proportionate extent, the cicatrization of which takes place readily. If the whole limb shall have been in a state of *necrosis*, nature is not sufficient of herself, having too many obstacles to overcome; at least that seldom happens: the resistance almost always surpasses the hurtful power: the patient sometimes sinks under it from the effect of the absorption which takes place, when the sloughs are separated, and the suppuration has opened the mouths of the absorbing vessels. This re-absorption proves destructive to organic life: a slow fever makes its appearance, with colliquative diarrhœa; the gaseous emanations of the gangrene attack the organs of respiration, and concur, with the first principle absorbed, to the general weakening of the functions. The gangrenous affection after a lapse of time more or less considerable, may pass directly into the neighbouring parts; but this communication never does or can take place before the ninth or tenth day, the period of the detachment of the sloughs: the vessels and cellular tissue are then capable of absorption, which nevertheless does not always take place. In this case the disease continues local; a separation is effected of the dead parts from those which preserve their vital force and action, and the general functions are not deranged: the fall of the dead portions takes place, the cicatrix of the wounds resulting from it is quickly effected, and the patient is cured.

On the contrary, however, where re-absorption happens, the organic functions undergo some change; as we have just observed, a fever supervenes, with colliquative diarrhœa; the powers of life are weakened, and the patient sinks under the disease.

Such is the progress, such the phenomena which the

gangrene of congelation presented to us in Poland; and we can vouch for it that it did not appear till the moment when the temperature was suddenly elevated, from a very low degree, to several degrees above the freezing point. I am of opinion, that unless the persons submitted for a very long time to the influence of cold, should remain in a state of perfect inaction, until *asphyxia* took place, or unless a second sedative or narcotic cause should act in concert with the cold interiorly, such as drunkenness, &c. I am of opinion, that partial or general death cannot take place during the continuance of the extreme cold.* In fact we have seen travellers cross the Alps and the Pyrennees during the most intense cold, without meeting with any accident, whenever the temperature experienced no change. I have had the opportunity of ascertaining this truth myself. The Poles choose the most constant period of the frost to undertake, with their sledges, the long and arduous journies into Siberia; these voyages are dreaded whenever the temperature becomes more or less changeable, because it is then, as they have assured me, that they have most to fear the effects of congelation. In my voyage to North America, a number of ship-wrecked men, whom we took off the island of Belleisle, near Newfoundland, in 1788, had passed several days in this island, lying upon the snow, during the most severe frost, without meeting with any accident. The evening before our appearance, at a period

* M. Larrey appears to have drawn very hasty and extensive conclusions from the phenomena observed during one single night in Poland. If he was fortunate enough to have accompanied the troops in the memorable expedition to Moscow, he might have had an opportunity of convincing himself that excessive cold can produce death without any of the conditions he has thought proper to prescribe. The phenomena, however, which occur in this case are very different to those exhibited by a frost-bitten limb; here is no gangrene, or sensible alteration of parts; but the body remains immoveable like a marble statue, in the position it chanced to be when the congelation took place. TRANSLATOR.

in which the temperature had changed, two of these unfortunate men perished altogether, and the feet of several others were affected with gangrene.

We had many similar instances in the army of the Eastern Pyrenees in the winter of 1795, and similar occurrences were observed during the conquest of Holland.

Experience teaches us, that these accidents may be avoided by shunning the fire, or any sudden impression of heat upon the parts benumbed with the cold. All these circumstances prove, that the cold is only the predisposing cause of the gangrene. Heat suddenly applied to the parts benumbed by the cold, may be considered as the determining cause. This principle once established, it is easy to prevent the effects of congelation.

When called in time enough to any person who has received a severe impression from the cold, so that the parts have already lost their movement, the heat is extinct, and the sensibility blunted, we must hasten to recal the powers of life to the parts thus weakened or stupefied. Frictions with snow or melted ice are the best means to adopt. The pure oxygen which these substances contain, and the caloric developed by the friction, being absorbed by the blood contained in the capillary vessels, excite the vessels and revive the blood. The circulation is thus restored, and the course of it is kept up by the subsequent application of spirituous and camphorated tonics, by the internal use of cordials gradually administered, dry and hot frictions over the whole surface of the body, and continued moderate exercise.

In case of a deficiency of ice and snow, in the first moments, cold red wine, or vinegar, or camphorated brandy, made cold by plunging it into the water of a well, may be employed. But the sudden application of heat of any kind, as we have before observed, must be carefully avoided; for unless gradually applied, it provokes gangrene, and accelerates greatly its developement; which proves that the old axiom *contraria contrariis curantur*, is not always strictly

true. When gangrene is established, and clearly marked, we must only look to the means of preventing its contagion, of facilitating the separation of the dead parts, and of fortifying those which remain sound. It is also necessary to support the strength of the patient, and to combat any febrile affection that may exist.

For this purpose, emollients must first be applied, whilst the patient is taking at the same time bark combined with bitters, good wine, and generous diet, but in small quantity. These means, together with the co-operation of nature, will be generally found sufficient, if the mortification is superficial. But if the gangrene has extended through the whole thickness of the limb, the powers of nature and the means we have laid down will be insufficient. The organs are weakened by the process of exfoliation, and before its final accomplishment the patient dies of exhaustion, or from the effects of re-absorption.

There is then an advantage in cutting off the portion of the limb that is mortified, as soon as the gangrene becomes defined, and its limits well marked out by the inflammatory line we have mentioned elsewhere. The amputation, however, must not be too long deferred, lest the patient being weakened, sink under it, particularly if the sphacelus is extensive. Amputation opportunely performed, in the place which either choice or necessity may point out, abridges the operation of nature, and insures the safety of the patient, without adding to the loss which he must inevitably sustain. The general effects of absorption are dissipated by cordials and antiseptics, especially by the use of good bark; and I have observed that the species of *quinquina*, called *loxa*, is the most efficacious in the removal of gangrenous affections.

The progress of this gangrene of congelation is different to that which we shall call traumatic, and which will be the subject of another memoir.

Memoir on the Plica Polonica.

By a letter from Osterode of the 25th of March, 1807, which I addressed to the Secretary of the Medical Society of Emulation, I announced to him, that the observations and researches which I had made on the subject of the plica during our campaigns in Poland, had convinced me that this singular affection was not a true disease of the hairs, as we have been assured by all travellers and physicians who have written on the epidemic diseases of Poland. They consider the plica as one of the symptoms, and as it were a crisis of the general disease, designated by the name of *tricoma*, in the same manner as in the plague, the buboes are regarded as one of the principal symptoms, and often as the crisis of the disease. In the works of physicians the description of the plica is consequently placed at the latter end of the descriptions they give of the general disease. In order to point out the error into which they have fallen, and to assign to each subject its true character, it is necessary first to examine the principal outlines.

All physicians agree in asserting, that the *tricoma* first discovers itself (like the constitutional syphilis) by a general loss of strength, a numbness of the limbs, and a gradual or sudden disappearance of the venereal sensations, of sleep, and appetite. Pains begin to be felt, and to fix themselves in the bones, especially of the cranium, of the legs, and at the joints: these pains increase during the night, and produce a febrile affection, with heat and dryness of the skin. These symptoms last during a longer or shorter period, and proceed with more or less intensity. Some medical observers have assured me, that they had sometimes seen profuse sweats, or a puriform discharge from the urethra come on spontaneously, and avert the disease. When these favourable circumstances do not take place

the disease continues with more or less force and rapidity, according to the constitution of the patient; according to the sex, age, season, place of habitation, &c.; for all these things produce more or less modification in the nature of the disease and in its progress.

At last the crisis arrives: the hairs, say they, become painful, thicken, tumefy, entangle and twist together, forming separate braids, or enormous masses. The cutting them is dangerous, and accompanied with pain, effusion of blood, or bloody and viscid humours. There frequently appear at the same time exostoses of the cranium, of the tibiæ, or cubitus; swellings of the joints, ulcers and pustules in different parts of the body, principally in the genitals, in the hands or head. The nature of these symptoms can hardly be misunderstood, since, according to these same authors, they have a great analogy with those which depend upon syphilis: their progress and duration are proportioned to the treatment employed, and to many other circumstances which may be easily conceived. Their termination may be either fortunate or fatal, like the syphilis of our country. Such is the sketch of the general symptoms of *tricoma*, described by authors. As to the particular alteration of the hairs, it produces different results, which constitute different species of plica. As for the rest, it would be difficult to describe all the external signs which characterize this pretended affection with more interest than Dr. Alibert has delineated them, in his excellent work on diseases of the skin. This physician does not conceal, that the want of observations, which it was impossible to make but on the spot, did not permit him to pronounce decidedly on the true character, the causes, and progress of this malady; but he carefully reports the opinion of different authors.

The information I have obtained from some enlightened physicians of Posen, Warsaw, Pultusk, and other places of Poland, induces me to believe, that this general disease, the *tricoma*, was imported from Asia into this country by the Sarmatians, whom historians make to have descended

from the Tartars and Scythians. The change of climate and regimen ought necessarily to have changed the nature of the disease they were in possession of: it was, without doubt, a syphilis, similar to that which we have seen in the interior of Egypt, and the origin of which appears to mount up to the remotest antiquity.

It cannot indeed be disputed that syphilis existed on the ancient continent, as well as the small-pox, long before the discovery of America. The proof of it may be found in a great number of authors, the reference to which I shall dispense with. Syphilis exerting sometimes its effects upon the skin, the membranes, and the bones of the cranium, the roots of the hairs may in that case be altered by it. They cannot be combed without pain; they entangle, change colour, or fall off. We have often witnessed this circumstance in France. In Poland, the hair may likewise experience, in consequence of the disease, a first degree of alteration, and, by the assistance of certain processes, the plica shortly after becomes completely developed. They favour this symptom, and encourage it as a salutary crisis; in consequence of which, they cover the hair with a cap of flannel, which has already been applied to such a purpose: this cap is no more taken off till the plica be fully formed, and they are obliged to wear it a longer or shorter time according to the season in which it breaks out, or the intensity of the pains which the patient experiences. In all cases, however, they never cut the plica formed in winter, till the Holy Saturday or Easter Sunday, a period at which they cut them all. Although the partizans of the plica place to its account all the symptoms which have preceded or accompanied it, they do not omit to employ diuretics, diaphoretics, antimonial, sulphureous, and mercurial preparations. Amongst the first, they extol greatly the lycopodium.

Dr. Lafontaine, at Warsaw, shewed us a great number of persons, almost all Jews, affected with the plica, who had experienced, or who still laboured under the symptoms

such as those we have reported, and which I recognized to be venereal or scrophulous. We may infer from this, that the *tricoma* is nothing else than a syphilitic affection, or a scrophulous affection, more or less concealed, either acquired or hereditary; diseases very common in this country, where they have existed, as we have observed above, time immemorial. This affection has been kept up, being propagated by the commerce between the two sexes, in the lower and wandering classes, of disorderly lives, and particularly amongst the inhabitants of the towns and cities, where this commerce is the most frequent; which is the reason that the Jews and artizans are most frequently attacked with it. For the same reason too we find the plica more rarely among the nobility and the inhabitants of the country. In the former class indeed it scarcely exists, because being more enlightened than the common people, they quickly apply the remedies to whatever accidents may happen to them: they are less blinded by prejudice, and live in a manner more proper for keeping away such affections. Many of our soldiers have contracted syphilis amongst the better kinds of inhabitants, but not one of them, to my knowledge, ever contracted the plica.

What are we to conclude from all these facts? That this peculiar affection of the hairs, supposing that it may be prepared in some individuals by the nature of the disease, depends principally on the little care which the Polish Jews and other persons of that description take of their hair, on their want of cleanliness, on their carelessness altogether, and the means which they employ to entangle their hair, and to bring on the plica, with the intimate persuasion that this affection will cure them of all those which they labour under. They are kept up in this error by the physicians, the greatest part of whom have imbibed the same opinion.

It is possible, however, that the thick animal cap, in concert with the remedies pointed out, may favour the crisis of an extraneous disorder, by keeping up on the head a great accumulation of heat, and in facilitating the per-

spiration of this part. In this point of view, the cutting off the hair might be dangerous, particularly in a severe season, or during the paroxysm of another disease; it is necessary at least to take the greatest precautions to prevent the dangerous contact of a cold and moist air upon an extremely sensible surface, deprived all at once of a natural covering, and one proper to transmit externally an excretion, the repercussion of which might be extremely prejudicial to the functions of the brain. These repercussions are capable of producing more active effects in Poland, in consequence of the extreme cold and moisture of the climate; and this is without doubt one of the principal motives, which have been the cause of the prohibition to cut off the plica in this country before Easter.

I am of opinion that the plica might be cut off without any inconvenience in any other season, except the winter, provided however that the precaution is taken to cover the head with a warm cap trimmed with fur. In the same manner it is prudent not to cut off the tangled hairs of a lying-in woman (which appear to bear the greatest relation to the *plica polonica)* until the cessation of her indisposition. It is then not useless to distinguish the period, and the circumstances under which the plica and entangled hairs, from whatever cause, ought to be cut off: but, independent of the influence which diseases of the head may have upon the hairs, we are convinced that the plica is a factitious local affection, almost independent of many other affections from which it has been made to proceed, and we shall prove this by the following facts:—

We have constantly observed in all cases of plica, though we have seen every kind and every degree of them, that the extremities of the hair were untouched; they preserved their natural colour, elasticity, and usual thickness. The roots were in every respect resembling the other extremity, or rather, this same hair at the root I have always found sound. If the body of the hair was really diseased or disorganized, its two extremities would necessarily partake of

the disease, which we have never seen. No Polish physician has been able to tell us either, whether any blood or bloody humour had ever been seen to flow from the divided hairs which had been cut off from the plica. The possibility of this fact may be confidently denied. The filaments which unite the bulb of the hair to its membraneous sheath, are so fine and delicate, that it is extremely difficult to determine the nature of them; it is still more so to understand the fluids circulating in them. It may, however, be advanced with certainty, that they do not admit the coloured part of the blood, since the finest injections cannot be made to pass into them. The experiments which I have made on a number of cases of plica, have as clearly proved, that the cutting off these tangled hairs was effected without any sensation of pain; and if the patient asserts that he feels any, or appears so to do (as is sometimes the case,) it depends on the shock or twitching inadvertently given to the membraneous sheath of the bulb, or the root of the hairs in cutting, especially when this is effected with bad scissars. The sheath of these bulbs, which may be regarded as the organ producing the hair, is the only part of this production which can partake of the irritation or inflammation of the skin; and in these cases, the hairs, far from becoming swelled up or inflaming like the skin, are affected with atrophy, become white, or else are detached from their capsules, and fall off. I have likewise cut off the entire plica from several patients in the civil hospital at Warsaw, without any inconvenience even resulting from it: it is true, that the persons I submitted to my experiments, were made to observe every precaution necessary to prevent accidents of every kind. All this proves, that this affection is the consequence of a want of cleanliness, and of the various processes which the inhabitants of Poland employ to give themselves this complaint. We have never observed the beard to participate in this disease, for this very simple reason, that the Jews take much more care of their beards than their hair, which circumstance comes into the support

of my assertion. The plica which has been observed on the hairs of the pubis, or elsewhere, may be the consequence of an old syphilitic affection of an obstinate nature, which has altered the bulbs of these hairs in such a manner, that they may admit fluids capable of softening them, and disposing them, in concert with the excessive heat of the skin, and the virulent emanations with which they are soaked, to curl up and frizzle like the hairs of a negro: they may likewise acquire thickness, and peculiar shades of colour. In either case, this affection, which is not of long duration, does not constitute a proper disease of the hairs; it is the temporary effect of the principal malady (syphilis) which, after having given rise to this change of the hairs, otherwise extremely rare, destroys entirely their excretory organ, and produces their falling off, or baldness.

As to the nails, the knotty and deformed state of which has been improperly attributed to a *metastasis* of the plica prematurely cut, an accident which the Polish physicians have assured me they never observed, we have known them to be disorganized, and to put on the most irregular shapes, in consequence of a repercussion of gonorrhœa, or of a chancre, which attacks their root. I have a striking instance of this first phenomena in the person of a soldier, who, after the sudden suppression of a gonorrhœa, was attacked immediately with a general erysipelas, the consequences of which were, an ulceration of the *dermis*, the detachment of the *epidermis*, and the disorganization of the nails both of the hands and feet, which in a short time presented a hideous appearance, by reason of the asperities with which they were covered, and the yellow colour they put on. The hairs of this patient were temporarily entangled, and shortly after he became bald altogether.

The falling off of the eye-lashes and eye-brows is frequently seen in those who have suffered a metastasis of a gonorrhœa to the eyes. It is a very disagreeable accident, and endangers vision: it may easily be prevented by a fresh

inoculation, whether natural or artificial, made in the urethra.

The instances of plica seen in animals, likewise depends on want of cleanliness, on the peculiar form of their hair, and the state of neglect in which these animals are left. The long fine hairs of the human head that are left loose easily entangle, so do the same kind of long hairs in animals. A length of hair is very frequent amongst the Poles: their horses, otherwise very small, have also their hair so long that it is rare not to find them affected with the plica.

If we are convinced that this singular affection is not a disease *sui generis*, and peculiar to the hairs, which in other cases cannot be morbidly changed but in a very imperfect manner by diseases of the skin, and certain viruses, it is needless to say any thing of its effects, and its contagion, which cannot possibly exist. We are likewise of opinion, that this affection can never form the crisis of another disease. It is an inconvenient, fatiguing burden, extremely uncleanly, and what may in the end influence the soundness of the animal functions. It would doubtless be an advantage to humanity, if these infirmities were prevented by cutting off the hair, by care and cleanliness. The Polish soldiers, who are compelled to observe these regulations, are never affected with the plica. Lastly, those cases which do occur, would be quickly remedied by cutting them off, with the precautions pointed out, and by applying on the remaining hairs an aromatic ointment, by keeping the head of the patient warm, and by paying particular attention to the nature of the extraneous symptoms, and to the entangling of the hairs, in order to destroy the cause which produces it, and put an end to its effects. It will also be necessary to inform the inhabitants on the true nature of diseases. This has been attempted to be concealed from them, without doubt from motives of interest, and in consequence of prejudices engendered certainly by fear and quackery. But the laws which have lately been instituted in their favour, by destroying the servitude under which two-thirds of the

Poles lived, will dispel these prejudices; the cupidity of empirics will be arrested; and that kind of emulation will be established amongst these people which will lead them to study their preservation, and to perfect their physical and moral education.

We need not then be alarmed at the effects of a disease which has nothing of contagion in its nature, and which is factitious. It is sufficient for us to have pointed out its true character, and to have made known its causes, in order to assign to it the place which it ought to occupy in the nosographical table of diseases of the skin.

END OF PART I.

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